IMPORTANT

Before you remove the Wire-Seal, check the contents of this envelope with the listing on the front of the envelope. If any part is missing, your Howard W. Sams distributor will replace the entire PHOTOFACT set IF the Wire-Seal has not been damaged.

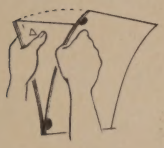
This PHOTOFACT Folder Set is

WIRE-SEALED FOR YOUR PROTECTION

to guarantee completeness of contents

DO NOT ACCEPT IF SEAL HAS BEEN BROKEN

TO OPEN ***JUST DO THIS:***



1

Take hold of the Set with both hands. Place your thumbs directly under the top wire-seal; then, divide the contents equally by putting your thumbs midway through the thickness of the Set. Now, pull the two sections apart at the top, firmly.

2

Repeat this process, pulling close to the wire-seal at the bottom, so that the set is now divided into two equal parts.

3

Continue this "pulling-apart" process with the section in which the wire-seals remain, dividing it in half.

4

Finally, remove the wire-seals left in the last section; this can easily be done with your fingernail or any sharp instrument.

Your "Safety-Sealed" PHOTOFACT Set is now ready for profit-making use . . .

IMPORTANT

Before you remove the Wire-Seal, check the contents of this envelope with the listing on the front of the envelope. If any part is missing, your Howard W. Sams distributor will replace the entire PHOTOFACT set IF the Wire-Seal has not been damaged.

The PHOTOFACT® Servicer

SET 494 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ AUGUST 1960

CONTENTS PHOTOFACT SET 494

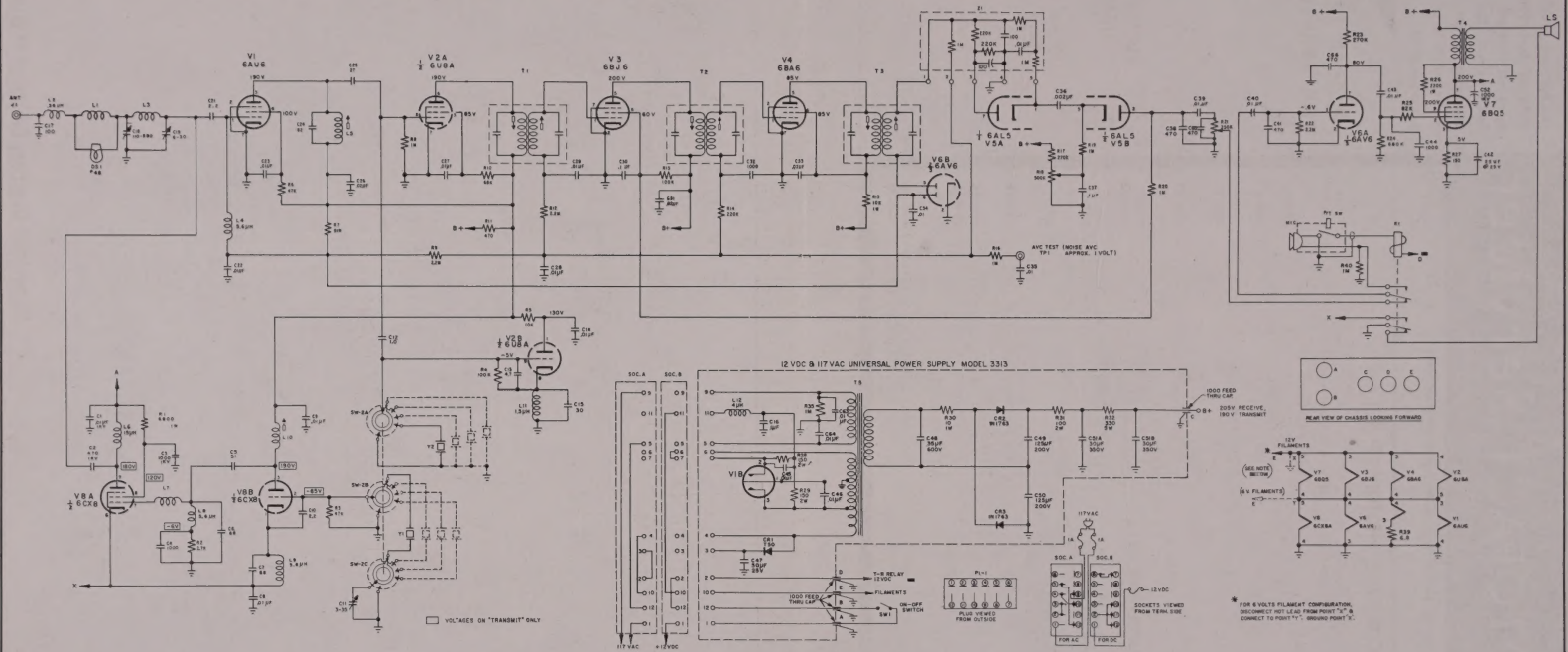
TRADE NAME AND MODEL	SET AND FOLDER NO.
TELEVISION RECEIVERS	
MAGNAVOX	
Chassis U28-03-11, -04-11, -07-11, -08-11, -10-11, V28-03-11, -04-11, -07-11, -08-11, -10-11	494-1
PACKARD-BELL	
21DK3, 23DK1 (Ch. 98D8, 8TU-2, DPA-20, RM-203)	494-2
PRODUCTION CHANGE BULLETIN 241	
TRUETONE	
2DC3130 (Television Receiver)	494-3
SILVERTONE	
1212, 1213, 1214 (Ch. 528.53740) (Transistor Radio)	494-3
OTHER EQUIPMENT	
AUTOMATIC	
CAP-49, CP-489F	494-4
BOGEN	
MO30	494-5
MO100	494-6
GENERAL ELECTRIC	
CT455A	494-7
RP1115A, RP1116A, RP1130A, RP1130B	494-8
HARMONY	
224	494-9
MORSE	
NL-202 (Tape Recorder)	494-10
MOTOROLA	
C4B, P, S (Ch. HS-752)	494-11
VWM60	494-12
OLYMPIC CONTINENTAL	
Tivoli 300	494-13
ROBIN	
TR-605	494-14
ROLAND	
AF1 (71-581), 7A1	494-15
SILVERTONE	
19, 20, 21, 22 (Ch. 132.45701)	494-16
47 (Ch. 528.53710, 711, 712)	494-17
WESTINGHOUSE	
H-M1500, H-M1501, H-M1502, H-M1503 (Ch. V-2510-3, V-2511-2)	494-18
H-729P7, H-730P7 (Ch. V-2402-1)	494-19

This Servicer provides you with essential data on other models or special equipment not covered in standard PHOTOFACT folders. The schematics and supplementary data included here will be of valuable help to you in servicing this equipment.

IN THIS ISSUE OF THE SERVICER:

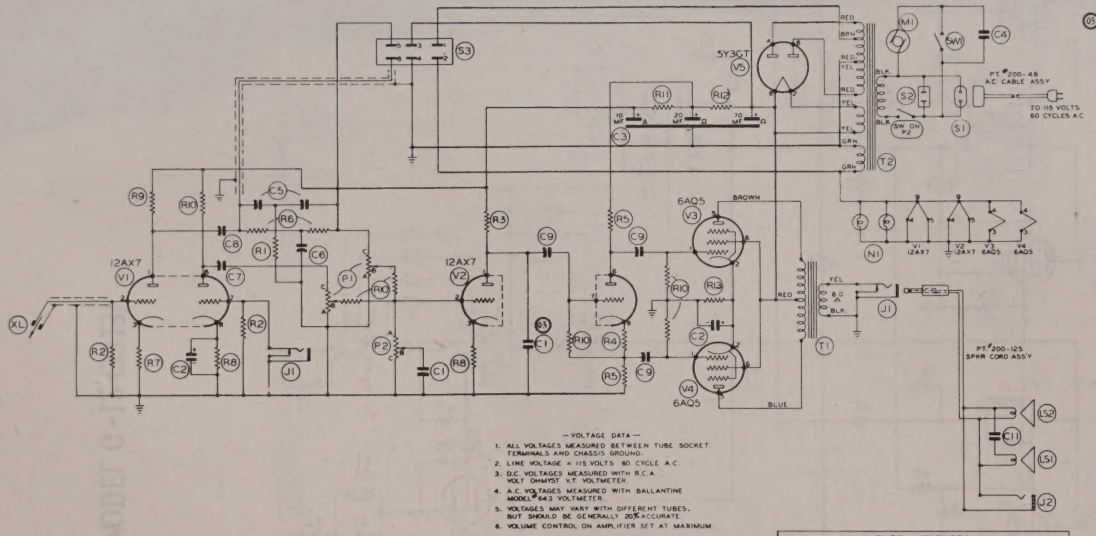
Dukane Model 14A245

Gonset Model G-12 (3313)


12 VDC & 117 VAC UNIVERSAL POWER SUPPLY MODEL 3313
VOLTAGES ON "TRANSMIT" ONLY
REAR VIEW OF CHASSIS LOOKING FORWARD
AVC TEST (NOISE AVC TP1 APPROX. 1 VOLT)
ON-OFF SWITCH
PLUG VIEWED FROM OUTSIDE
SOCKETS VIEWED FROM TERM. SIDE
FOR AC
FOR DC

GONSET MODEL G-12 (3313)

Schematic Diagram Courtesy of Gonset Division, Young Spring & Wire Corp.



— VOLTAGE DATA —

1. ALL VOLTAGES MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS GROUND.
2. LINE VOLTAGE = 115 VOLTS 60 CYCLE A.C.
3. D.C. VOLTAGES MEASURED WITH R.C.A. VOLT OHMYST V.T. VOLTMETER.
4. A.C. VOLTAGES MEASURED WITH BALLANTINE MODEL #643 VOLTMETER.
5. VOLTAGES MAY VARY WITH DIFFERENT TUBES, BUT SHOULD BE GENERALLY 20% ACCURATE.
6. VOLUME CONTROL ON AMPLIFIER SET AT MAXIMUM.

LIST OF ELECTRICAL PARTS

LEGEND	DESCRIPTION	QNTY	PART NO.
(03)	C1 CAPACITOR .001 MFD. 600V.	2	199-4038-102
	C2 " 25 " 25 V.	2	199-2931
	C3 " 70-20-10 " 350V.	1	199-2933
	C4 " .02 " 600V.	1	199-4038-203
	C5 " .01 " 200V.	2	199-4013-103
	C6 " .02 " "	1	199-4013-203
	C7 " .01 " 400V.	1	199-4025-103
	C8 " .02 " "	1	199-4025-203
(03)	C9 " .047 " "	3	199-4025-473
	C11 " 2 " 200V.	1	199-4018-205
	V1,V2 ELECTRON TUBE 12AX7	2	262-12AX7
	V3,V4 " " 6AQ5	2	262-6AQ5
	V5 " " 5Y3GT	1	262-5Y3GT
	J1 JACK	2	415-4
	J2 "	1	415-3
	N1 LAMP-PILOT MADZA #47	2	456-1
	M1 PHONO MOTOR	1	494-50
	XL PICKUP CARTRIDGE-CERAMIC	1	563-53
	S1 RECEPTACLE-POWER	1	597-81
	S2 " -PROJECTOR	1	597-75
	S3 " -TRIGGER AMPL.	1	597-9613
	R1 RESISTOR 150K OHM 1/2 W.	1	600-0080-154
	R2 " 1.5 MEG. " "	2	600-0080-155
	R3 " 68K " "	1	600-0080-683
	R4 " 2700 " "	1	600-0080-272
	R5 " 27K " "	2	600-0080-273
	R6 " 270K " "	2	600-0080-274
	R7 " 1800 " "	1	600-0080-182
	R8 " 4700 " "	2	600-0080-472
	R9 " 100K " "	1	600-0080-104
	R10 " 470K " "	6	600-0080-474
	R11 " 10K " 1 W.	1	600-0116-103
	R12 " 4700 " "	1	600-016-472
	R13 " 250 " 5 W.	1	600-1008-251
	P1 POTENTIOMETER 0.5 MEG.	2	601-112
	P2 " 0.5 MEG. (SW.	1	601-111
	SW1 SWITCH-PHONO MOTOR S.P.S.T.	1	680-157
	T1 TRANSFORMER-OUTPUT	1	710-2068
	T2 " POWER	1	710-4117
	LS1 SPEAKER 3½"	1	645-14
	LS2 " 6 x 9 "	1	645-15

TUBE VOLTAGES

TUBE TYPE	SOCKET PIN NUMBERS 1	2	3	4	5	6	7	8	9
V1 12AX7	D.C. 180		D.C. 1.45	0	0	D.C. 105		D.C. 1.35	A.C. 6.3
(04) V2 12AX7	D.C. 200		D.C. 1.8	0	0	D.C. 250	D.C. 16.0	D.C. 2.3	A.C. 6.3
V3 6AQ5		D.C. 17.5	0	A.C. 6.3	D.C. 280	D.C. 290			
V4 6AQ5		D.C. 17.5	0	A.C. 6.3	D.C. 280	D.C. 290			
V5 5Y3GT		D.C. 290 A.C. 5.0		A.C. 270		A.C. 270		D.C. 290 A.C. 5.0	

DUKANE MODEL 14A245

Schematic Diagram Courtesy of Dukane Corporation

PHOTOFACT® Folder

MAGNAVOX CHASSIS
U28-03-11, -04-11, -07-11, -08-11, -10-11,
V28-03-11, -04-11, -07-11, -08-11, -10-11

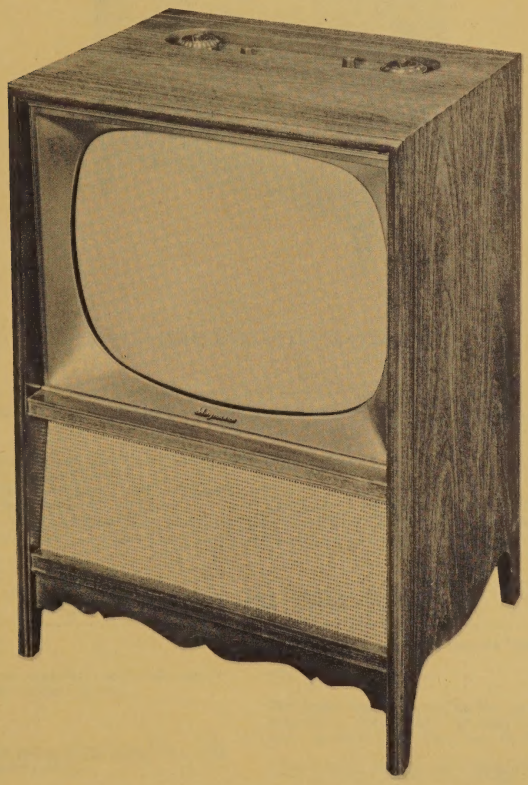
IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

MAGNAVOX CHASSIS
U28-03-11, -04-11, -07-11, -08-11, -10-11,
V28-03-11, -04-11, -07-11, -08-11, -10-11

MAGNAVOX CHASSIS
U28-03-11, -04-11, -07-11, -08-11, -10-11,
V28-03-11, -04-11, -07-11, -08-11, -10-11



REPRESENTATIVE MODEL USING CH. U-28-04-11

SET494 FOLDER 1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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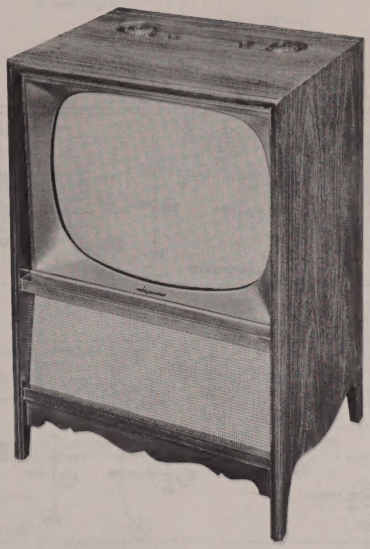
MAGNAVOX CHASSIS
U28-03-11, -04-11, -07-11, -08-11, -10-11,
V28-03-11, -04-11, -07-11, -08-11, -10-11

MAGNAVOX CHASSIS
U28-03-11, -04-11, -07-11, -08-11, -10-11,
V28-03-11, -04-11, -07-11, -08-11, -10-11



REPRESENTATIVE MODEL USING CH. U-28-04-11

MAGNAVOX CHASSIS
U28-03-11, -04-11, -07-11, -08-11, -10-11,
V28-03-11, -04-11, -07-11, -08-11, -10-11

TRADE NAME	MAGNAVOX	CHASSIS	U28-03-11, U28-04-11, U28-07-11, U28-08-11, U28-10-11, V28-03-11, V28-04-11, V28-07-11, V28-08-11, V28-10-11
MANUFACTURER	Magnavox Co., 2131 Bueter Road, Fort Wayne 4, Indiana		
TYPE SET	Television Receiver		
TUBES	VHF - Seventeen, UHF - Eighteen		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING	180 Watts, 1.6 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 4 screws holding the trim strip at the top edge of the safety glass. Tilt glass out and remove.

FUSE

A fuse is used for horizontal sweep circuit protection. (For location, see "Tube Placement Chart".)

A fuse wire is used for filament protection. (For location, see M3 in Photo "Chassis Bottom View".)

TUNER OSCILLATOR ADJUSTMENTS

To touch up the VHF Oscillator, it is necessary to remove the rear cover. The adjustments are accessible thru a hole in the right side of the tuner rear cover as viewed from the rear of the tuner.

AGC

The AGC may be varied by means of a Local-Suburban-Distant Switch. (For location, see "Tube Placement Chart".)

FOCUS

The focus may be varied by the position of a strap on the base of the picture tube, by connecting jumper to pins 6 and 1 (ground) or to pins 6 and 10 (530V).

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

Coarse adjustment of the Horizontal Hold is accomplished by the proper setting of the Horizontal Frequency Slug (B1). (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by a Width Coil. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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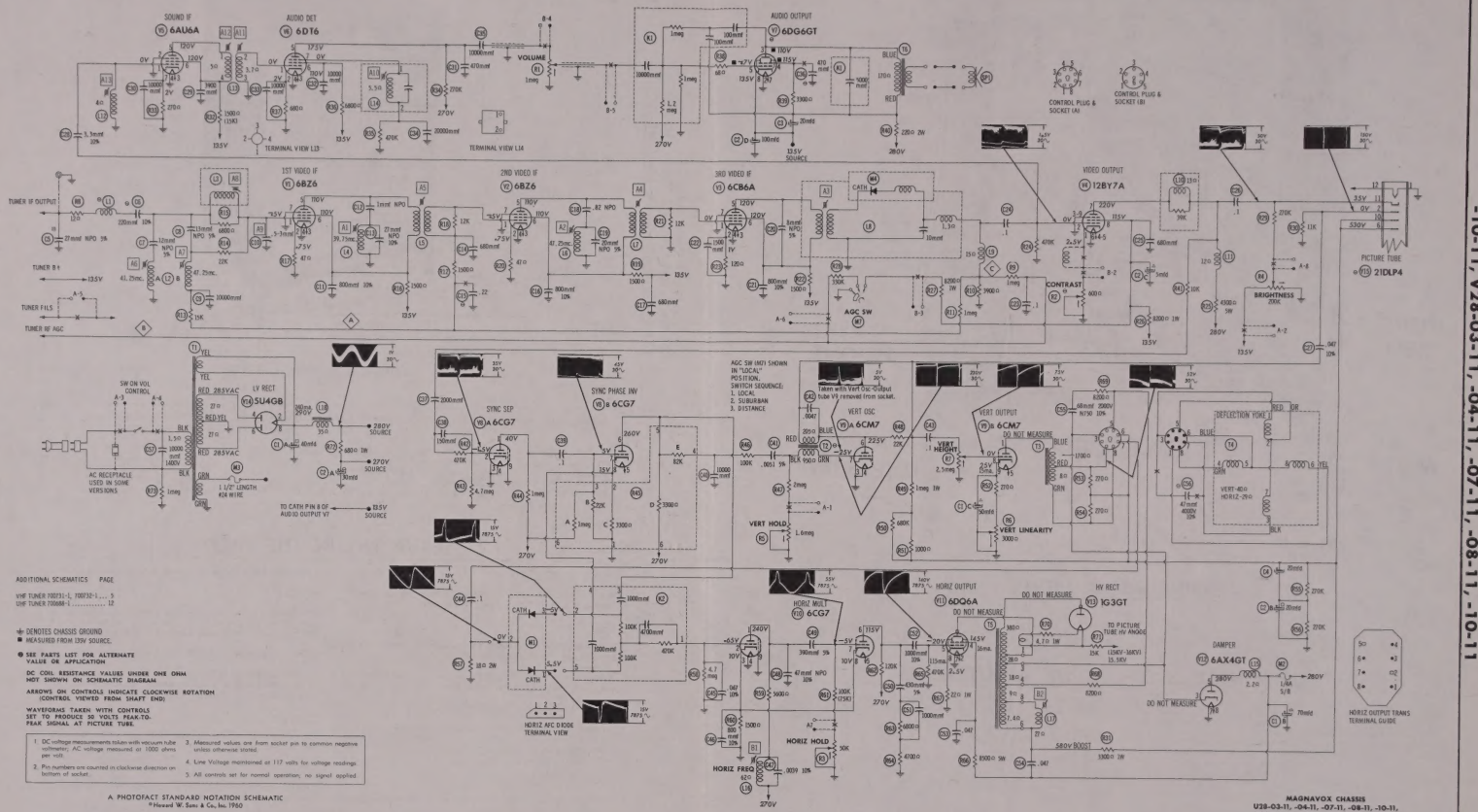
KA91



ADDITIONAL SCHEMATICS PAGE

VHF TUNER 700731-1, 700732-1 5
UHF TUNER 700688-1 12

⏚ DENOTES CHASSIS GROUND
■ MEASURED FROM 120V SOURCE.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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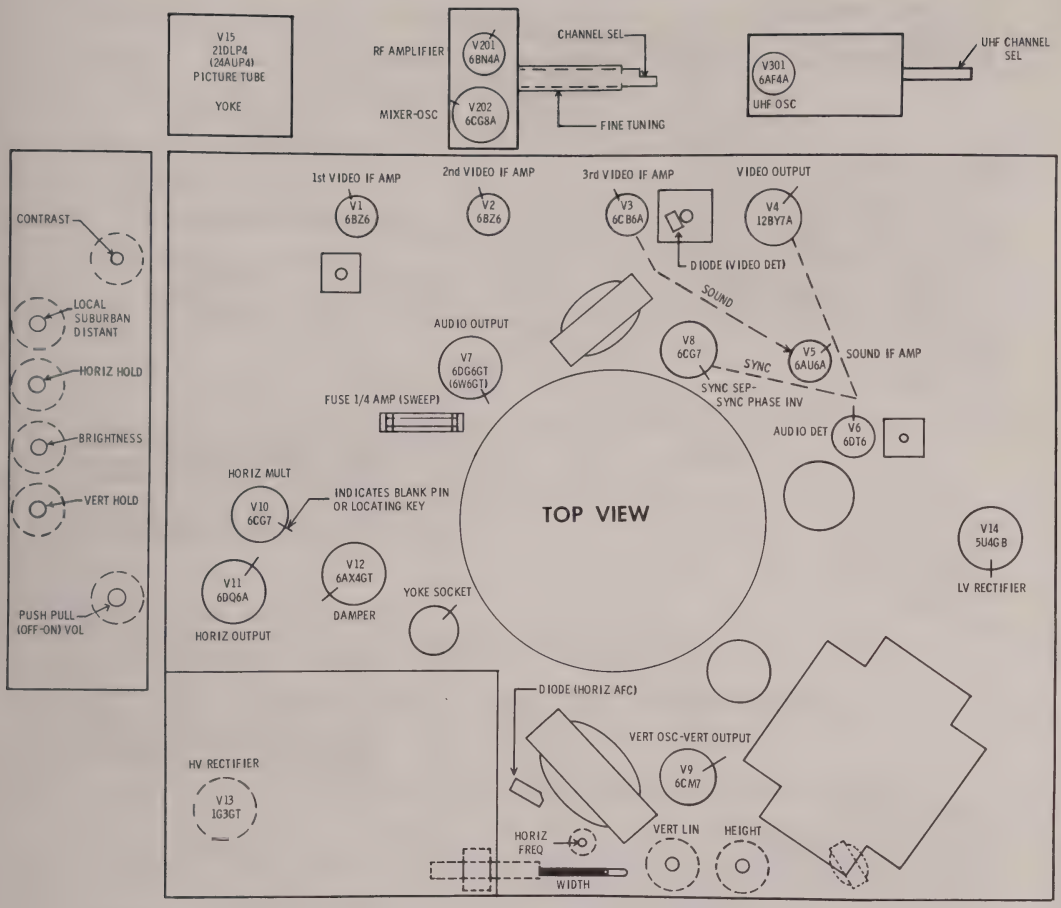
MAGNAVOX CHASSIS U28-03-11, -04-11, -07-11, -08-11, -10-11
V28-03-11, -04-11, -07-11, -08-11, -10-11

TUBE PLACEMENT CHART



MAGNAVOX CHASSIS
U28-03-11, -04-11, -07-11, -08-11, -10-11,
V28-03-11, -04-11, -07-11, -08-11, -10-11

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound Fuse (Fil.), V14

SWEEP FAILURE
No raster, has sound V10, V11, V12, V13, Fuse (Sweep), V15
No vertical deflection V9
Poor vert. linearity or foldover V9
Poor horiz. linearity or foldover V10, V11, V12
Narrow picture V10, V11, V12, V14
Vert. off freq. V9
Horiz. off freq. Diode (Horiz. AFC), V10

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det.)
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has rasterV4, V15
Has pic, no sound V5, V6, V7

SYNC FAILURE
No vert. sync V8
No horiz. sync V8, Diode (Horiz. AFC)
No vert. or horiz. sync V8

FOLDER 1

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: A1, A2, and A4 thru A11 .... GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A3 ..... GENERAL CEMENT #8721, 8722
WALSCO #2519
Mixer Plate Coil ..... GENERAL CEMENT #9296, 9297
WALSCO #2546, 2547

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias supply to point (A). Positive to chassis.
Connect the negative lead of a 2.5 volt bias supply to point (B). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	High side thru .01mfd to pin 1 (grid) of 1st Video IF. Low side to chassis.	44.0MC (10MC Swp.)	39.75MC	Any non-interfering channel	Vert. Amp. thru 10K to point (C). Low side to chassis. (Across Video Det. load.)	A1	Adjust to place marker in trap notch. (See Fig. 1.)
2.	"	"	47.25MC	"	"	A2	"
3.	"	"	42.25MC 45.0MC 45.75MC	"	"	A3, A4, A5	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. A3 controls gain at center of curve, A4 controls 45.75MC marker and A5 controls 42.25MC marker.
4.	Place a thin insulated metal strip between the Mixer-Osc. tube and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	"	"	"	"	Mixer Plate Coil	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown.
5.	"	"	41.25MC	Any non-interfering channel	"	A6	Adjust to place marker in trap notch. (See Fig. 2.)
6.	"	"	47.25MC	"	"	A7, A8	"
7.	"	"	45.75MC	"	"	A9	Adjust A8 and retouch Mixer Plate Coil for maximum gain and proper tilt maintaining position of 45.75MC marker as shown in Fig. 2.

SOUND IF ALIGNMENT

Preset A10 for MINIMUM inductance.
Tune in a strong TV signal (preferably a tone signal or music). Adjust A10 just past the point of maximum sound with MINIMUM distortion. Reduce the signal level by disconnecting the antenna leads or placing an adjustable attenuator pad across the terminals so that with the volume set near maximum, sound is at a low level. Tune the Fine Tuning through undistorted sound. Set the Fine Tuning at the verge of distortion. Adjust A11, A12 and A13 for MINIMUM distortion.
Readjust the Fine Tuning as necessary during adjustment of A11, A12 and A13 to maintain the conditions described above.

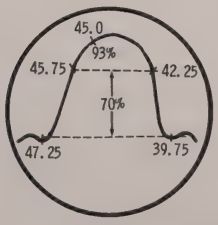


FIG. 1

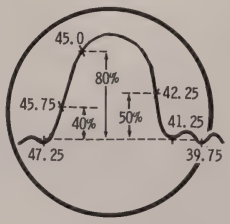
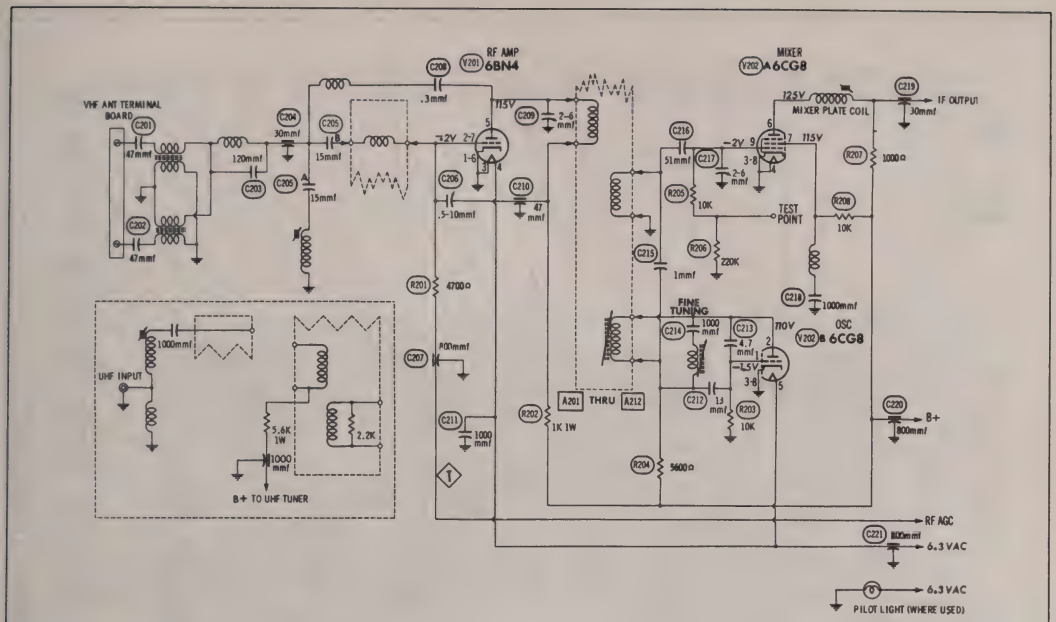


FIG. 2

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGE 11



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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TUNER 700731-1, 700732-1

TUNER PARTS LIST AND DESCRIPTIONS

700731-1

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V201	RF Amp.	6BN4	V202	Mixer-Osc.	6CG8

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	47		BPD-000047	DD-470	L10Q47	CCD-470	CNO-447	10TS-Q47
C202	47		BPD-000047	DD-470	L10Q47	CCD-470	CNO-447	10TS-Q47
C203	120 10%		DI-20	DD-121	L10T12	CCD-121	CNO-312	10TS-T12
C204	30							
C205A	15		BPD-000015	DD-150	L10Q15	CCD-150	CNO-415	10TS-Q15
B	15		BPD-000015	DD-150	L10Q15	CCD-150	CNO-415	10TS-Q15
C206	.5-10			829-10				
C207	800		EF-001	MFT-1000		CCF-102	CT280A	
C208	.3							
C209	2-6			829-6		CV-3	CT552	
C210	47		EF-00005	MFT-50				
C211	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C212	13 N220 5%					*		10TCR-Q12
C213	4.7 N220 ±.25mmf					*		10TCR-V47
C214	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C215	1.0		NPO-SI 1	TCZ-1			CNO-510	10TCC-V10
C216	51 N750 10%		N750-SI 51	TCN-51	C10Q51U	CCTN-560	CN7-456	10TCU-Q56
C217	2-6			829-6		CV-3	CT552	
C218	30							
C219	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C220	30							
C221	800		EF-001	MFT-1000		CCF-102	CT280A	
C222	800		EF-001	MFT-1000		CCF-102	CT280A	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

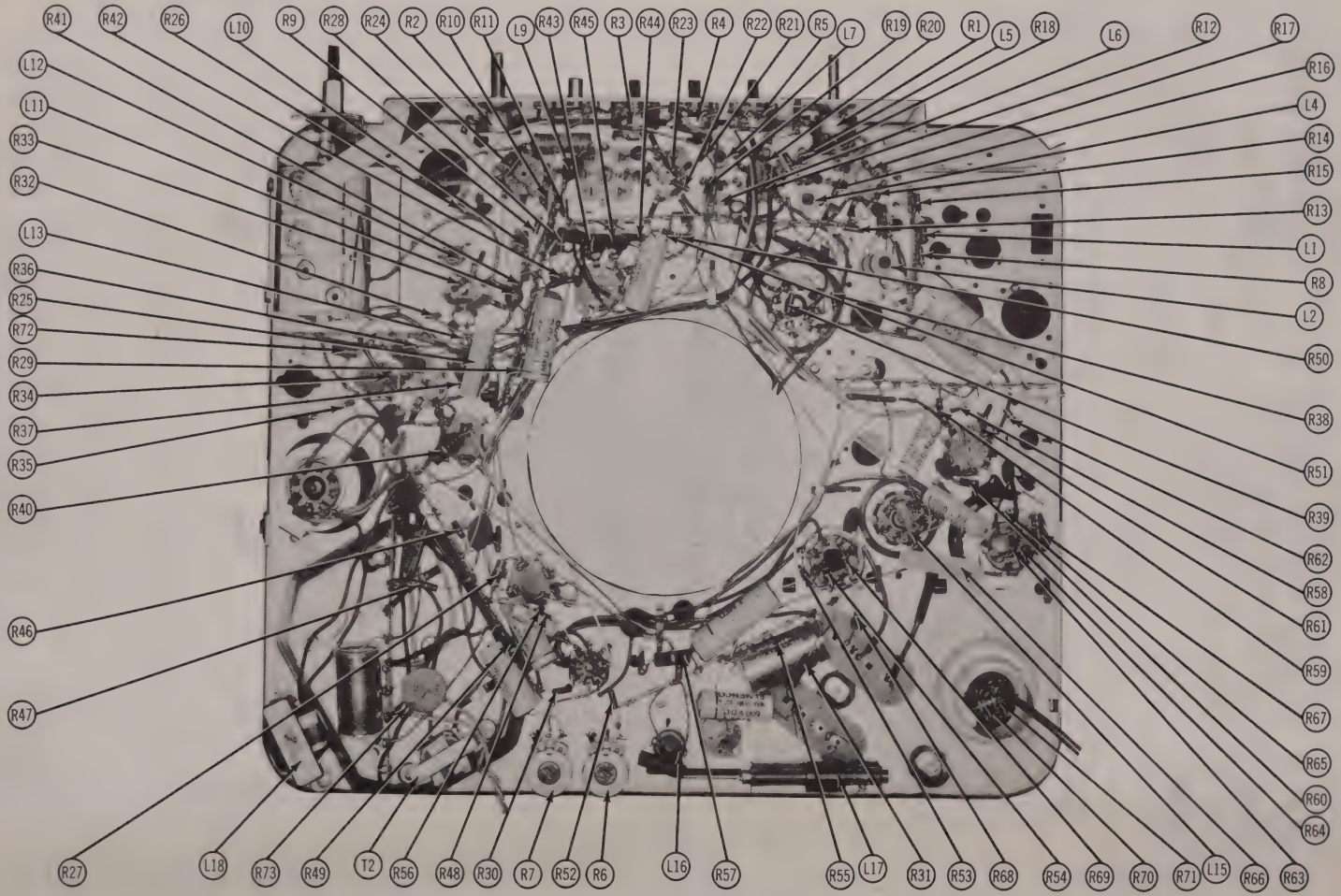
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

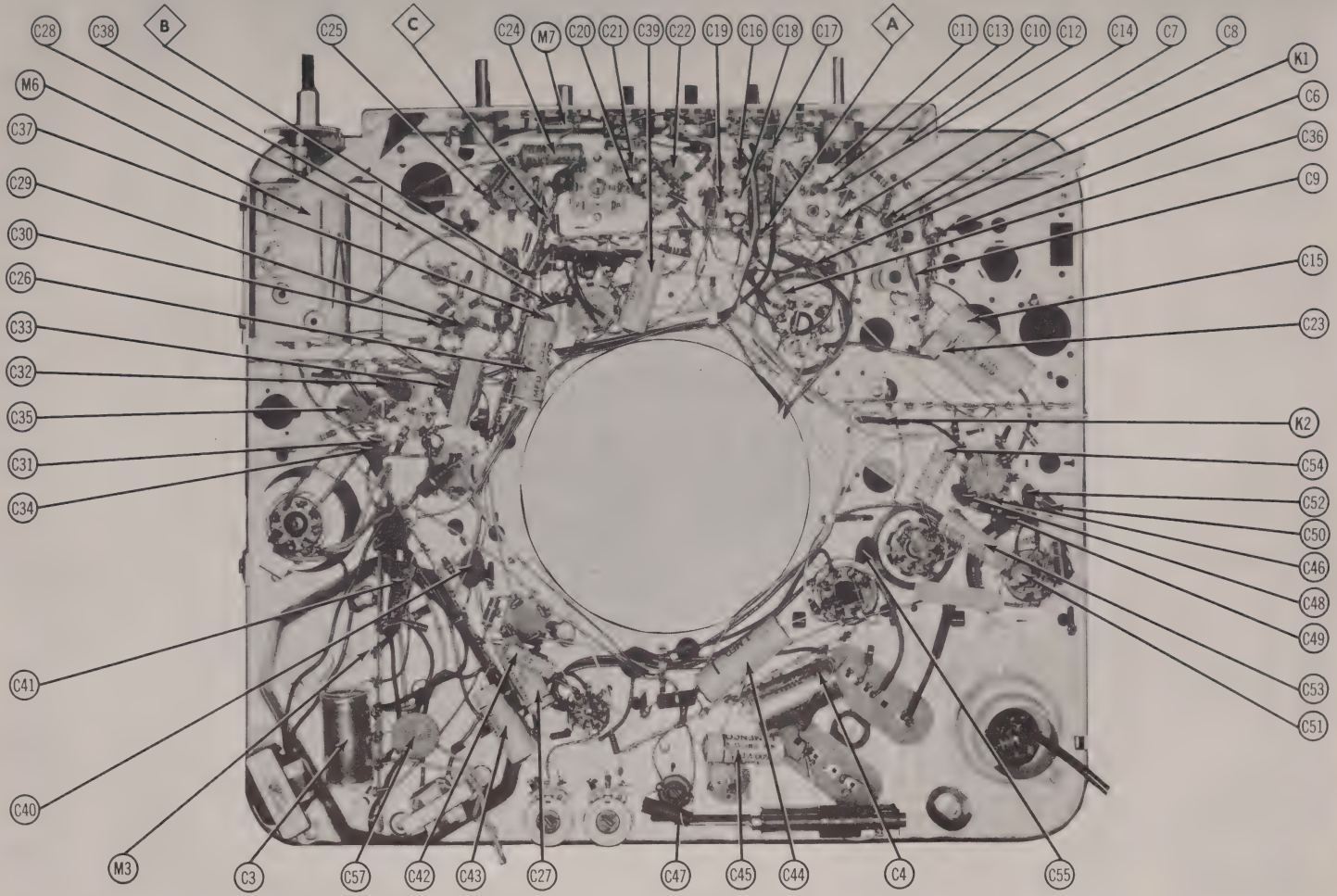
ITEM No.	RATING	REMARKS
R201	4700Ω	
R202	1000Ω 1W	
R203	10K	

ITEM No.	RATING	REMARKS
R204	5600Ω	
R205	10K	

ITEM No.	RATING	REMARKS
R206	220K	
R207	1000Ω	



CHASSIS BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.



CHASSIS BOTTOM VIEW - CAPACITOR & MISC. IDENT.

MAGNAVOX CHASSIS U28-03-11, -04-11, -07-11, -08-11, -10-11, V28-03-11, -04-11, -07-11, -08-11, -10-11

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	CBS	GENERAL ELECTRIC	RAYTHEON	SYLVANIA
	USE	TYPE	USE	TYPE
V1	1st Video IF Amp.	6BZ6	V8 Sync Sep.- Sync Phase Inv.	6CG7
V2	2nd Video IF Amp.	6BZ6	V9 Vert. Osc. - Vert. Output	6CM7
V3	3rd Video IF Amp.	6CB6A	V10 Horiz. Mult.	6CG7
V4	Video Output	12BY7A	V11 Horiz. Output	6DQ6A
V5	Sound IF Amp.	6AU6A	V12 Damper	6AX4GT
V6	Audio Det.	6DT6	V13 HV Rect.	1G3GT
V7	Audio Output	6DG6GT (6W6GT)*	V14 LV Rect.	5U4GB

* Alternate

PICTURE TUBE

ITEM No.	REPLACEMENT DATA					NOTES
	MAGNAVOX PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
V15	21DLP4 24AUP4		21DLP4 ①	21DLP4 ① 24AUP4 ①	21DLP4 ② 24AUP4 ②	① Aluminized ② Silver Screen "85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	MAGNAVOX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	●40	350	27002I-52	AFH3-154-30	C1D6	FP368.5	TMQ-181	TVL-3756	
B	●70	350							
C	●50	50							
C2A	●30	350	27002I-54	AFH4-56-93.5	D64I8	FP430.33	TMQ-182	TVL-4634.7	
B	●20	350							
C	●5	350							
D	100	200							
C3	20	350	270027-20	PRH735	BR3035	TC63		TD-20-350	TVA-1608
C4	20	350	270027-20	PRH735	BR3035	TC63		TD-20-350	TVA-1608

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REMARKS	REPLACEMENT DATA						
					AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	27	NPO	5%	Note 1		TCZ-27	C10Q27C		CNO-427	10TCC-Q27	
C6	220		10%	Note 2	DI-230	DD-221	L10T22	CCD-22L	GP322	10TS-T22	
C7	12	NPO	5%			TCZ-12	C10Q12C		CNO-412	10TCC-Q12	
C8	13	NPO	5%			TCZ-13	C10Q13C		CNO-413	10TCC-Q2	
C9	10000				BPD-01	BYA10S6	DD-103		D-110	5HK-S10	
C10	.5-3						529-3		CY-1	CT565	
C11	500		10%		DI-500		DD-501	CCD-501	GP363	10TS-T50	
C12	1		NPO		NPO-SI 1.0	TCZ-1			CNO-510	10TCC-V10	
C13	27	NPO	10%		NPO-DI 25	TCZ-27	C10Q27C		CNO-427	10TCC-Q27	
C14	680				BPD-00068		BYA10T68	CCD-681	D-368	10TS-T68	
C15	.22	200V		Note 3	P388N-22		CUB2P23	2DP-4-224	GEM-2023	2TM-P22	
C16	500		10%		DI-500	DD-501		CCD-501	GP362	10TS-T50	
C17	680				BPD-00068	DD-681	BYA10T68	CCD-681	D-368	10TS-T68	
C18	.02	NPO		#250088-182							
C19	20	NPO	5%			DTZ-20	C10Q2C		CNO-420	10TCC-Q20	
C20	5	NPO	5%		NPO-DI 5.2		C10V5C			10TCC-V52	
C21	500		10%		DI-500	DD-501		CCD-501	GP363	10TS-T50	
C22	1500				BPD-0015	DD-152	BYA10D15	CCD-152	D-315	5HK-D15	
C23	.1	200V			P388N-1	DF-104	CUB2P1	2DP-3-104	GEM-301	2TM-P1	
C24	.1	200V			P388N-1	DF-104	CUB2P1	2DP-3-104	GEM-301	2TM-P1	
C25	680				BPD-00068	DD-681	BYA10T68	CCD-681	D-368	10TS-T68	
C26	.1	400V			P488N-1	DF-104	CU84P1	4DP-3-104	GEM-401	4TM-P1	
C27	.047	400V	10%		V84C4847-10%		PM4847	4DP-3-473	GEM-1615	4TM-S47	
C28	3.3		10%		NPO-SI 3.3	TCZ-3R3	C10V33C	CCD-33S	CNO-533	10TCC-V33	
C29	3900				BPD-004	DD-392	L10D39	CCD-392	GP329	10TS-D29	
C30	10000				BPD-01	DD-103	BYA10S6	CCD-103	D-110	5HK-S10	
C31	470				BPD-00047	DD-471	BYA10T47	CCD-471	D-347	10TS-T47	
C32	10000				BPD-01	DD-103	BYA10S6	CCD-103	D-110	5HK-S10	
C33	10000				BPD-01	DD-103	BYA10S6	CCD-103	D-110	5HK-S10	
C34	20000				BPD-02	DD-203	BYD86S2	CCD-103	D-120	5HK-S20	
C35	10000				BPD-01	DD-103	BYA10S6	CCD-103	D-110	5HK-S10	
C36	470			Note 3	BPD-00047	DD-471	BYA10T47	CCD-471	D-347	10TS-T47	
C37	2000				BPD-002	DD-202	BYA10D2	CCD-202	D-220	5HK-D20	
C38	150				1468-00015	DD-151	5WT15	CM-15B-151M	MC2S5	1FM-S15	
C39	.1	400V			P488N-1	DF-104	CU84P1	4DP-3-104	GEM-401	4TM-P1	
C40	10000				BPD-01	DD-103	BYA10S6	CCD-103	D-110	5HK-S10	
C41	.0051	400V	5%		V84C526-5%		1MS105I	CM-20B-512J		MS-2D1	
C42	.0047	400V			P488N-0047	D6-472	CU84D47	6DP-4-472	GEM-6347	6TM-D47	
C43	.1	400V			P488N-1	DF-104	CU84P1	4DP-3-104	GEM-401	4TM-P1	
C44	.1	500V			P868N-1	DF-104	CU86P1	6DP-4-104	GEM-501	6TM-P1	
C45	.047	200V	10%		V84C2847-10%		PM2847	2DP-3-473		2TM-S47	
C46	800		10%		DI-S20	DD-801	1RS78	CCD-801	GP362	10TS-T80	
C47	.0039	200V	10%		V84C5D4-10%		PM5D4	5DP-1-392	MCJ462.5	MS-S29	
C48	47	NPO	10%		NPO-DI 47	DTZ-47	C10Q47C	CCTO-470	CNO-447	10TCC-Q47	
C49	390		5%		1469-00039		5HS739	CM-19B-391J	MCE343	MS-339	
C50	430		5%		1469-00043		5HS745	CM-19B-431J		MS-343	
C51	1000				BPD-001	DD-102	BYA10S6	CCD-102	B-110	5HK-D10	
C52	1000		10%		DI-1000	DD-102	1RS1K	CCD-102	GP310	10TS-D10	
C53	.047	400V			P488N-047	DD-503	CU84S47	4DP-3-473	GEM-6147	4TM-S47	
C54	.047	600V			P668N-047	DD-503	CU86S47	6DP-3-473	GEM-6147	6TM-S47	
C55	68	2000V	N750	10% #250175-22							
C56	47	4000V	10%	Note 3						6DY-447	
C57	10000	1600V			DAC-27	DD6-103	HYE16SL	16DP-3-103		UAC-110	BL-S10

Note 1. Not used in Ch. 28-08-11.
Note 2. Ch. 28-08-11 uses 470mmf in this application.
Note 3. May not be used in some versions.
Magnavox Part Number.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	MAGNAVOX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	1meg	½	230135-1		C47S-1meg-Z	B11-137	FP18A	Volume
B	Switch					SK7	Not Req.	Push-Pull, Off-On

CONTROLS (cont)

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MAGNAVOX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R2A	500Ω	½	230126-73	B-415	A47-750-S	Q47-105	U3	Contrast Note 1
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	50K	½	230146-9	BX-51	B47-50K-S	B11-123	PTA54L	Horiz. Hold
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R4A	200K	½	230146-10	BX-46	B47-200K-S	B11-129	U43	Brightness
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R5A	1 6meg	½	230146-11	BX-743	B47-1.5meg-S	B11-135	PTA38L	Vert. Hold
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R6A	3000Ω	½	230146-9	AB-8	B47-3000-S	B11-113	PTA382L	Vert. Linearity
B	Shaft			AK-19	Not Req.	TM4	Not Req.	
R7A	2.5meg	½	230146-2	BX-53	B47-2.5meg-S	B11-259	TA2551	Vert. Height
B	Shaft			Not Req.	Not Req.	Not Req.	Not Req.	

Note 1. Alternate Part #220146-71.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R8	12Ω	
R9	1meg	
R10	390Ω	
R11	1meg	
R12	150Ω	
R13	15E	
R14	22K	
R15	680Ω	
R16	150Ω	
R17	47Ω	
R18	12K	
R19	150Ω	
R20	47Ω	
R21	12K	
R22	150Ω	
R23	1300	
R24	470K	
R25	4300Ω 5W	#240073-1
R26	8200Ω 1W	
R27	6200Ω 1W	
R28	2310Ω	
R29	370K	
R30	11K	
R31	3300Ω 1W	

ITEM No.	RATING	REMARKS
R32	1500Ω	(15K) *
R33	270Ω	
R34	270K	
R35	470K	
R36	6800Ω	
R37	680Ω	
R38	68Ω	
R39	3300Ω	
R40	330Ω 2W	
R41	10K	
R42	470K	
R43	4.7meg	
R44	1meg	
R45A	1meg	
B	22K	
C	3300Ω	
D	3300Ω	
E	82K	
R46	100K	
R47	2meg	
R48	22K	
R49	1meg 1W	
R50	680E	#250130-2
R51		

ITEM No.	RATING	REMARKS
R52	1000Ω	
R53	270Ω	
R54	270Ω	
R55	270K	
R56	270K	
R57	180 2W	
R58	4.7meg	
R59	5600Ω	
R60	1500Ω	
R61	100K	(75K) *
R62	130K	
R63	6800Ω	
R64	4700Ω	
R65	470K	
R66	8500Ω 5W	#240071-25
R67	220 1W	
R68	8200Ω	
R69	8200Ω	
R70	6.7Ω 1W	
R71	16K	
R72	680Ω 1W	
R73	1meg	

Magnavox Part Number. * Alternate Value.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		MAGNAVOX PART No.	Gramer PART No.	Meissner PART No.	Miller PART No.	Ram PART No.	
L1	RF Choke	360803-1 ①					
L2A	41.25MC Trap	360803-1	30-1044	30-1044	TV-131	6235	VT-4
B	47.25MC Trap		17-4533	17-4533	TV-133	6235	
L3	1st Video IF	360798-1	30-1044	30-1044	TV-131	6235	VT-4
L4	39.75MC Trap	360801-1	17-4538	17-4538	TV-153	6235	
L5	2nd Video IF	360799-1	17-4523	17-4523	TV-130	6219	
L6	47.25MC Trap	360801-1	17-4538	17-4538	TV-153	6235	
L7	3rd Video IF	360799-2	17-4523	17-4523	TV-130	6219	
L8A	4th Video IF	360800-1					
B	RF Choke		19-1002	19-1002	RC-563	4806	2uh
C	RF Choke		19-1008	19-1008		4811	8uh
L9	Shunt Peaking Coil	360623-12	19-3500	19-3500	TV-203	6174	VP-8 500uh
L10	Series Peaking Coil	360623-15 ②	19-3250 †	19-3250 †	TV-185 †	6181 †	VP-5 † 235uh
L11	Shunt Peaking Coil	360623-16	19-3300	19-3300	TV-198	6130	VP-6 275uh
L12	1st Sound IF	360722-1	17-4632	17-4632	TV-119	1470	RF-3
L13	2nd Sound IF	360715-1			TV-149		
L14	Quadrature Coil	360716-2	17-1031 =	17-1031 =	TV-134 =	1481 =	SD-5
L15	RF Choke	360601-6 ③	19-1003	19-1003	RC-564	4808	3.3uh

① Not used in Chassis 28-08-11.
② Wound on 39K Resistor.
③ IRC Part #CLA.

† Parallel with 39K Resistor.
= Drill mounting holes.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	
L16	62Ω		360579-2	HS-5	TV-163	62D	H-102	HS-5	Horiz. Stabilizer

COILS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA								NOTES
		MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
L17	Width Coil	360699-1	WC-19 ①	MWC-12 ①	6315 ①	20R3A ①	QRC-104 ①	WC-18 ①		WLC-3 ①	

① Drill new mounting hole.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE @ CURRENT 1000 ^(•)/)	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L18	.340A	35Ω	.5 Hy.	320068-4				C-2543 ①		C-36X

① Drill new mounting hole.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2		MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V	370 VCT @ 1.6A	5V @ 3A		300170-1				P-8356		R-67BC①
	SEC. 3	SEC. 4	SEC. 5								
	6.3V @ 5.8A										

① Use MB-20 mounting bracket kit.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA							
		MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc.	320262-5	26A09	A-8003	V606	VB019	A-8125		A-97X
T3	Alt. Vert. Osc.	320260-4							
T4	Vert. Output	320263-3	26364 ①	A-2334 ②	V315 ③	V051 ①	A-8141 ①		A-138X
	Yoke Horiz. (20MC) (90°) Vert. (40MC)	700702-1	Y-16 ④⑤	MDF-42 ②③④⑤	Y90F19/43 ③④⑤	PCM2045 ③④⑤	DY-16A ④⑤⑥		Y-41 ④
	Rear Corner and Centering Device	360771-1							YC-112
T5	Horiz. Output	360777-1	FLY-158 ⑦	FLYO-175 ⑦					D-192 ⑦

① Drill new mounting holes.
② Cut and tape blanking lead.
③ Requires new rear cover, centering device, and yoke clamp.
④ Connect same as original.
⑤ Remove horiz. and vert. damping networks from yoke.
⑥ Use original mounting bolts.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Ram Replacement Connections	Rogers Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
1	8	8					1
3	5	5					3
4	3	3					4
8	2	2					8
6	1	1					6
Connect Width Coil Arms →	8 & 6	2 & 1	2 & 1				8 & 6

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T6	3100Ω	3-4Ω	320279-1	26350	A-3018	AU-600	A-3823	26350	S-67X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MAGNAVOX PART No.	QUAM PART No.	
SP1	8"	PM	3-4Ω	583688	8A21	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	MAGNAVOX PART No.	REPLACEMENT DATA
K1	Audio Output Grid & Plate	100mmf, 100mmf, 5000mmf, 10000mmf, 1meg, 1.5meg	250300-1	
K2	Horiz. AFC	1000mmf, 1000mmf, 4700mmf, 100K, 100K, 470K	250298-1	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	MAGNAVOX PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1		530045-3 ①	ITI ③	K3616 ①			① Dual Selenium Diode ② Silicon Diode, 2 req'd

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MAGNAVOX PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	1/4A 250V 5/8	180157-30		313.250 (3AG 1/4A 250V 5/8)	357001	MDL 1/4	4405
M3	1 1/2"	length of #24 wire						

MAGNAVOX CHASSIS U28-03-11, -04-11, -07-11, -08-11, -10-11; V28-03-11, -04-11, -07-11, -08-11, -10-11

FOLDER 1

PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		MAGNAVOX PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M4	1N64		1N60	1N60	1N64	Video Det. (Pigtail)

MISCELLANEOUS

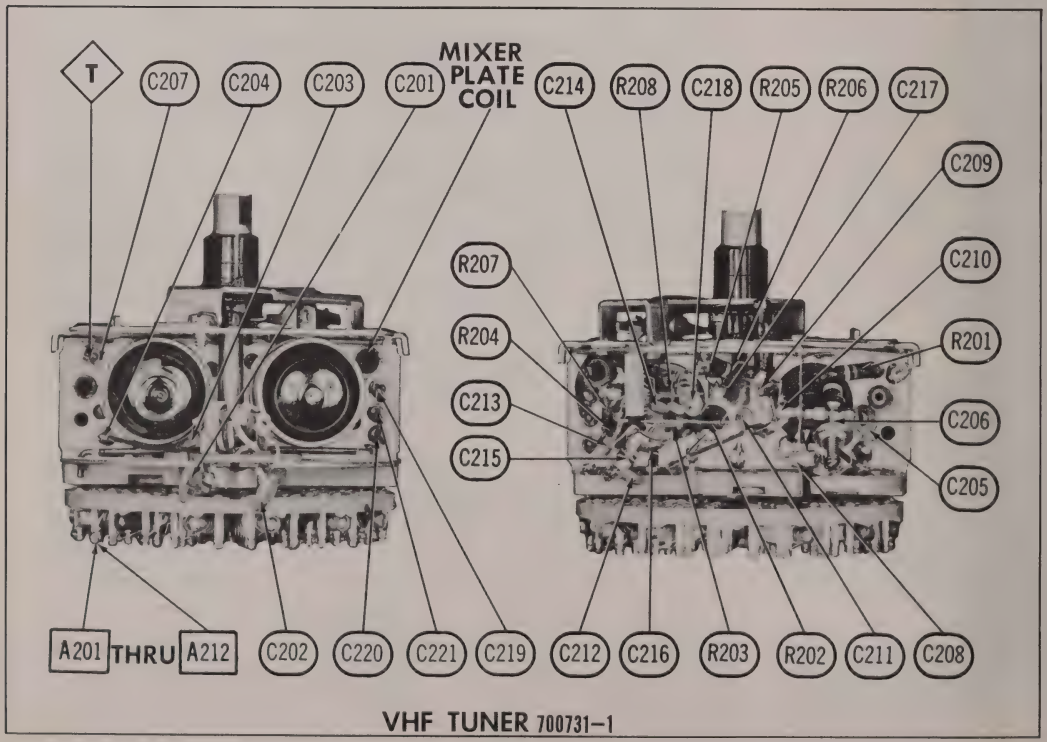
ITEM No.	PART NAME	MAGNAVOX PART No.	NOTES
M5	Tuner	700732-1	VHF with UHF Provisions
	Tuner	700731-1	VHF
M6	Tuner	700688-1	UHF
M7	Switch	160274-1	AGC (Rotary Wafer Type)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

WIRING DATA

High Voltage Lead	Use BELDEN No.	8869
Shielded Hook-up Wire	Use BELDEN No.	8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No.	8874
300Ω Tuner Input Lead	Use BELDEN No.	8225
300Ω Antenna Lead-in	Use BELDEN No.	8230 or 8275
Antenna Rotor Cable	Use BELDEN No.	8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor



VHF TUNER 700731–1

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of a 1.5 volt bias supply to point ⊕. Positive to chassis.
Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Set the Fine Tuning to the center of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across Video Det. load.	A201	Adjust to place sound marker in trap notch as in Fig. 201. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A202	
			201MC	199.25MC 203.75MC	11		A203	
			195MC	193.25MC 197.75MC	10		A204	
			189MC	187.25MC 191.75MC	9		A205	
			183MC	181.25MC 185.75MC	8		A206	
			177MC	175.25MC 179.75MC	7		A207	
			85MC	83.25MC 87.75MC	6		A208	
			79MC	77.25MC 81.75MC	5		A209	
			69MC	67.25MC 71.75MC	4		A210	
			63MC	61.25MC 65.75MC	3		A211	
			57MC	55.25MC 59.75MC	2		A212	

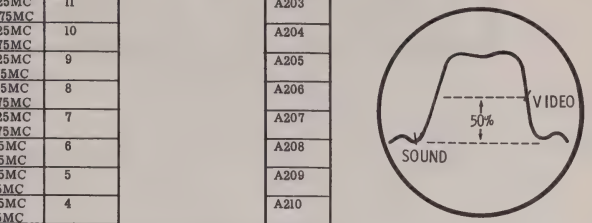


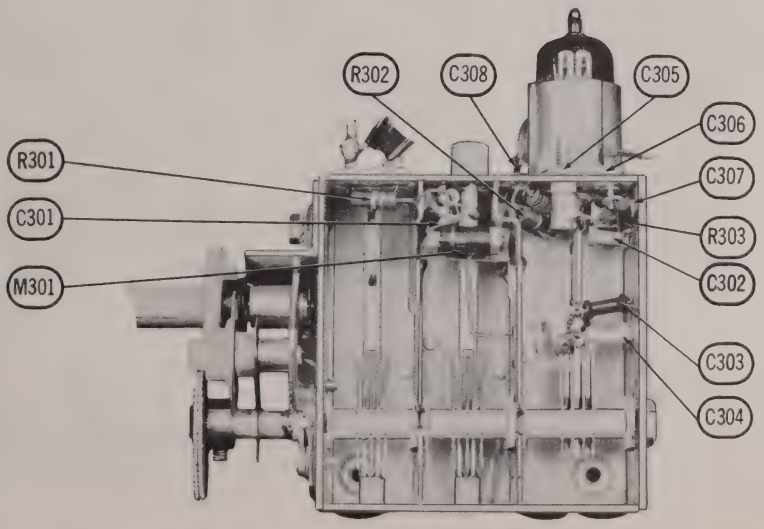
FIG 201

VHF RF AND MIXER ALIGNMENT

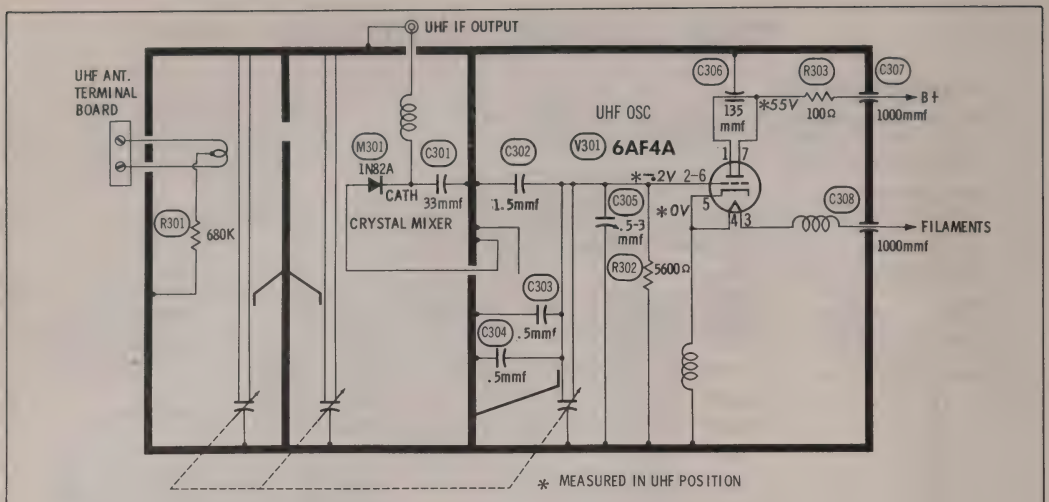
This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

UHF TUNER

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.



UHF TUNER 700688-1



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UHF TUNER 700688-1

TUNER PARTS LIST AND DESCRIPTIONS

700688–1

TUBES

CBS		GENERAL ELECTRIC		RAYTHEON		SYLVANIA	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE		
V301	UHF Osc.	6AF4A					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C301	33			TCZ-33	C10Q33C	CCTO-330	CNO-33	10TCC-Q33
C302	1.5		NPO-SL 1.5	TCZ-1R5	C10V15C		CNO-515	10TCC-V15
C303	.5		NPO-SL 5	TCZ-R5				
C304	.5		NPO-SL 5	TCZ-R5				
C305	.5-3			829-3		CV-1	CT565	
C306	135							
C307	1000		EF-001	MFT-1000		CCF-102	CT280A	
C308	1000		EF-001	MFT-1000		CCF-102	CT280A	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R301	680K	

ITEM No.	RATING	REMARKS
R302	5600Ω	

ITEM No.	RATING	REMARKS
R303	100Ω	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		MAGNAVOX PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M301	1N82A		1N82A	1N82A	1N82A	UHF Mixer (Clip-in)

CHASSIS - TOP VIEW

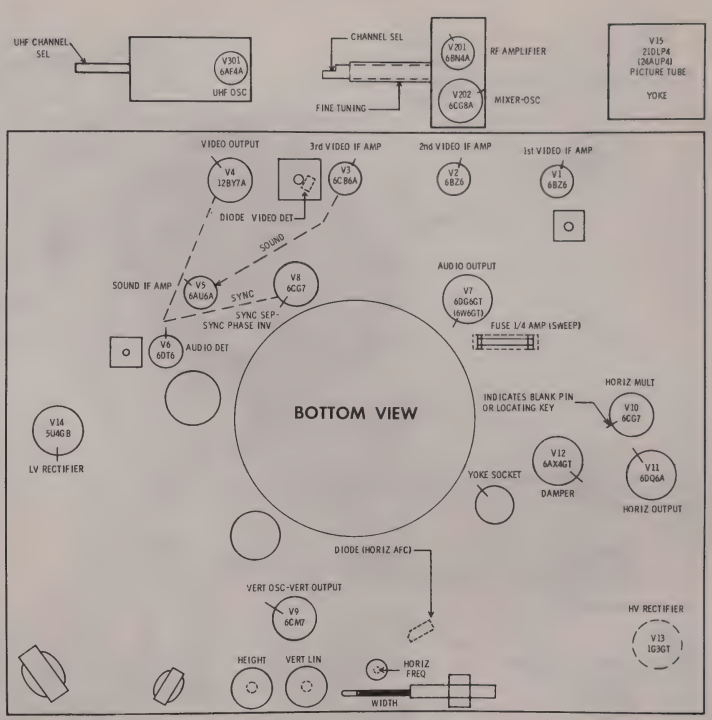
RESISTANCE MEASUREMENTS

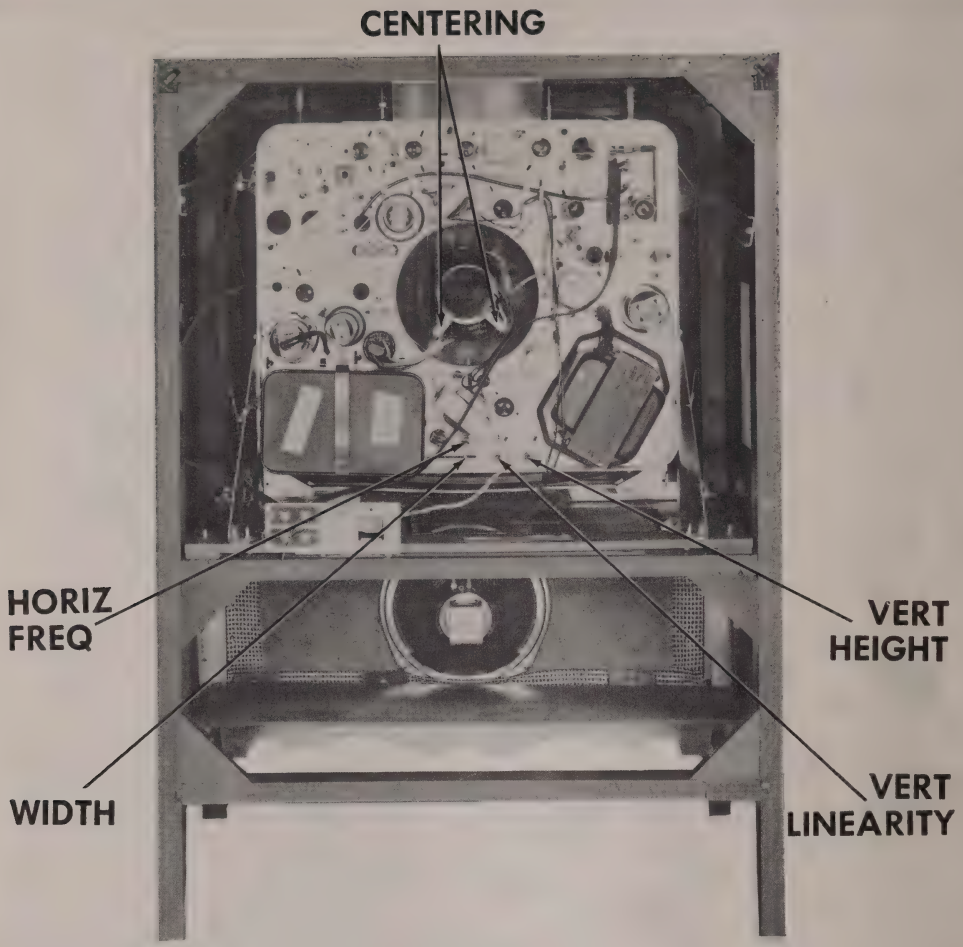
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	1meg	47Ω	.1Ω	0Ω	▪1500Ω	▪1500Ω	0Ω		
V2	6BZ6	1meg	47Ω	.1Ω	0Ω	▪1500Ω	▪1500Ω	0Ω		
V3	6CB6A	.2Ω	120Ω	.1Ω	0Ω	▪1500Ω	▪1500Ω	0Ω		
V4	12BY7A	●40Ω	470K	0Ω	.1Ω	.1Ω	0Ω	†4300Ω	▪8200Ω	0Ω
V5	6AU6A	4Ω	0Ω	.1Ω	0Ω	▪1500Ω	▪1500Ω	270Ω		
V6	6DT6	3.7Ω	680Ω	.1Ω	0Ω	†270K	▪6800Ω	470K		
V7	6DG6GT	TP	0Ω	†390Ω	†3500Ω	700K	TP	.1Ω	¶	
V8	6CG7	†1meg	4.7meg	0Ω	0Ω	.1Ω	†4000Ω	22K	3300Ω	0Ω
V9	6CM7	†5200Ω	NC	0Ω	0Ω	.1Ω	†1.4meg	●2.5meg	●1.7meg	●1700Ω
V10	6CG7	†6300Ω	3meg	1500Ω	0Ω	.1Ω	†120K	●130K	1500Ω	0Ω
V11	6DQ6A	NC	.1Ω	TP	†8500Ω	470K	TP	0Ω	22Ω	TOP CAP †28Ω
V12	6AX4GT	TP	NC	¶550K	NC	†35Ω	NC	0Ω	.1Ω	
V13	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP †410Ω
V14	5U4GB	NC	¶	NC	27Ω	NC	27Ω	NC	¶	
V15	21DLP4	0Ω	11K	Pin 6 †3300Ω	Pin 10 †3300Ω	Pin 11 ●300K	Pin 12 .1Ω			
V201	6BN4A	0Ω	250K	0Ω	.1Ω	▪1000Ω	0Ω	250K		
V202	6CG8A	10K	▪5600Ω	0Ω	0Ω	.1Ω	▪1000Ω	▪10K	0Ω	230K
V301	6AF4B	▪*6700Ω	5600Ω	.1Ω	0Ω	.2Ω	5600Ω	▪*6700Ω		
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
● THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM PIN 8 OF V14.
▪ MEASURED FROM 135V. SOURCE.
* MEASURED IN "UHF" POSITION.
† MEASURED FROM PIN 3 OF V12.

NC NO CONNECTION
TP TIE POINT

TUBE PLACEMENT CHART





CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Set the Horizontal Hold Control to the center of its range. Adjust the Horizontal Frequency Slug (B1) until the picture synchronizes horizontally. Keep turning B1 in the same direction until the picture just falls out of sync. Reverse the direction of rotation until the picture just falls into sync. Rotate the Horizontal Hold Control to both extreme ends of rotation. The picture should either stay in sync at both ends of rotation or should fall out of sync by an equal number of bars at each end. If neither of these conditions occur, repeat procedure.

Adjust the Width Slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

PHOTOFACT® Folder with CIRCUITRACE®

PACKARD-BELL MODELS 21DK3, 23DK1 (Ch. 98D8, 8TU-2, DPA-20, RM-203)

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

PACKARD-BELL MODELS 21DK3, 23DK1
(Ch. 98D8, 8TU-2, DPA-20, RM-203)

MODEL 23DK1 (CH. 98D8, RM-203, 8TU-2, DPA-20)

PACKARD-BELL MODELS 21DK3, 23DK1
(Ch. 98D8, 8TU-2, DPA-20, RM-203)

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PACKARD-BELL MODELS 21DK3, 23DK1 (Ch. 98D8, 8TU-2, DPA-20, RM-203)

PACKARD-BELL MODELS 21DK3, 23DK1 (Ch. 98D8, 8TU-2, DPA-20, RM-203)

MODEL 23DK1 (CH, 98D8, RM-203, 8TU-2, DPA-20)

TRADE NAME	PACKARD-BELL	MODELS	CHASSIS	
		21DK3, 23DK1	98D8 (TV) RM-203 (Remote Control) 8TU-2 (FM-AM Tuner)	DPA-20 (Stereo Amp.) RMS-2 (Remote Balance Control)
MANUFACTURER	Packard-Bell Electronics Corp., 1920 So. Figueroa St., Los Angeles 7, Calif.			
TYPE SET	Television Receiver (With Remote Control, FM-AM Tuner, Stereo Amp., and 4 Speed Automatic Record Changer)			
TUBES	TV: VHF-Twenty One FM-AM Tuner: Eight Stereo Amp.: Seven			
POWER SUPPLY	110-120 Volts AC, 60 Cycle			
RATING	400 Watts, 3.6 Amp. @ 117 Volts AC (While Tuning) 380 Watts, 3.4 Amp. @ 117 Volts AC (Not Tuning) 255 Watts, 2.6 Amp. @ 117 Volts AC (TV Only) 150 Watts, 1.3 Amp. @ 117 Volts AC (Radio, Amp., Phono, Less Motor)			
TUNING RANGE	TV: Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (intercarrier) FM-AM Tuner: FM 88-108MC, IF 10.7MC AM 530-1620KC, IF 455KC			

FOR SERVICE INFORMATION ON COLLARO "CONQUEST" RECORD CHANGER (PACKARD-BELL PART #580740) SEE PHOTOFACT SET 390 FOLDER 5; GLASER-STEERS MODEL 77 (PACKARD-BELL PART #58084) SEE PHOTOFACT SET 399 FOLDER7

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

The safety glass in Model 23DK1 is an integral part of the picture tube (23CP4).

FUSE DEVICE

A Circuit Breaker is used for low voltage power supply protection and may be reset by depressing the reset button. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENTS

The VHF Oscillator Adjustment is reached thru rear cover of Tuner.

AGC

The AGC may be varied by means of an AGC Control. (For location, see "Tube Placement Chart".)

FOCUS

The focus may be varied by means of a Focus Control. (For location, see "Tube Placement Chart".)

SYNC STABILITY

Sync stability may be varied by means of an ANI Control. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

The Horizontal Frequency Slug is used for the Horizontal Hold. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by a Width Coil. (For location, see "Tube Placement Chart".)

HORIZONTAL DRIVE

The horizontal drive may be varied by a Horizontal Drive Control. (For location, see "Tube Placement Chart".)

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Ratio Detector secondary (A14) located at bottom of chassis.

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

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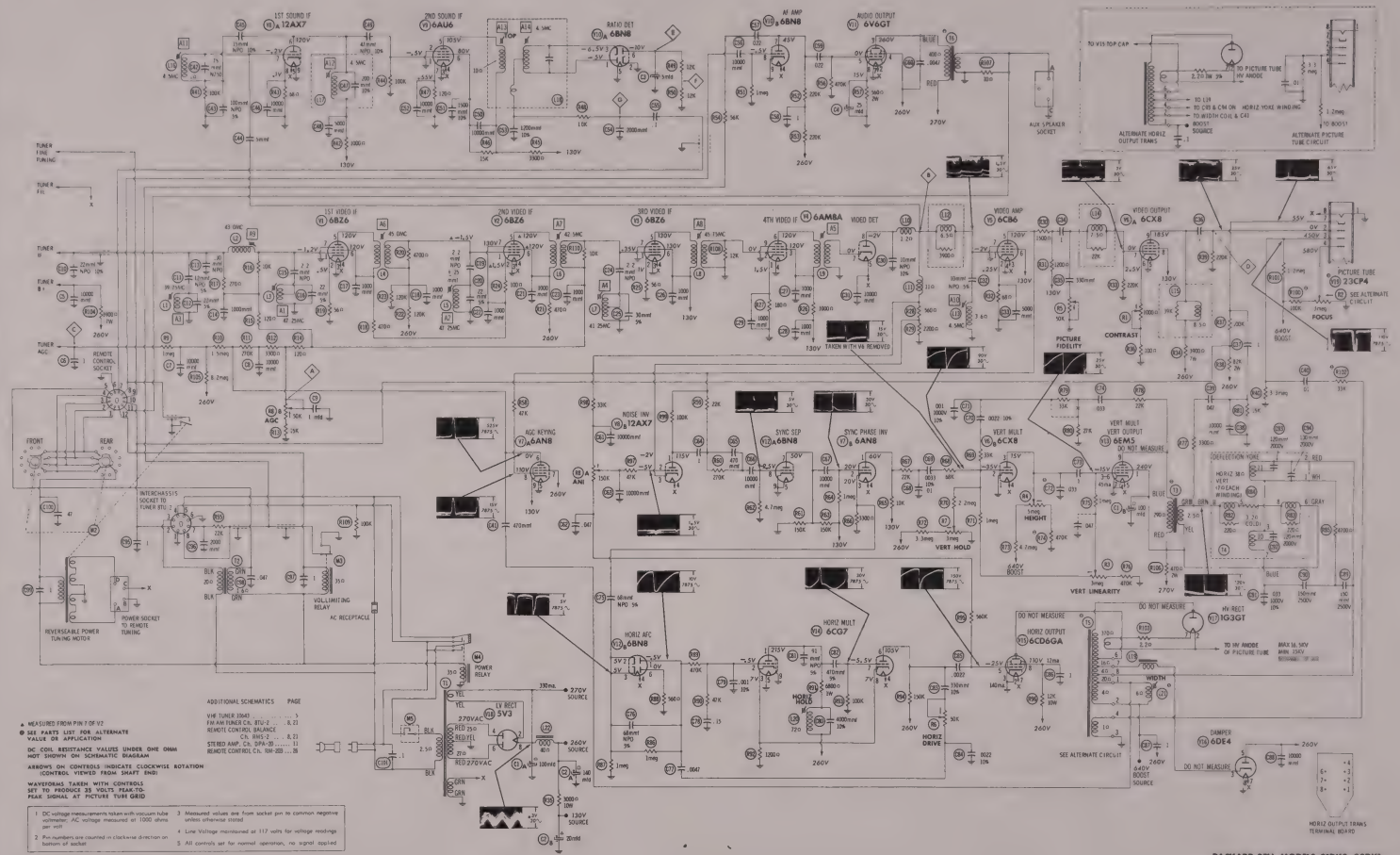
KC5


PACKARD-BELL MODELS 21DK3, 23DK1
(Ch. 98D8, 8TU-2, DPA-20, RM-203)
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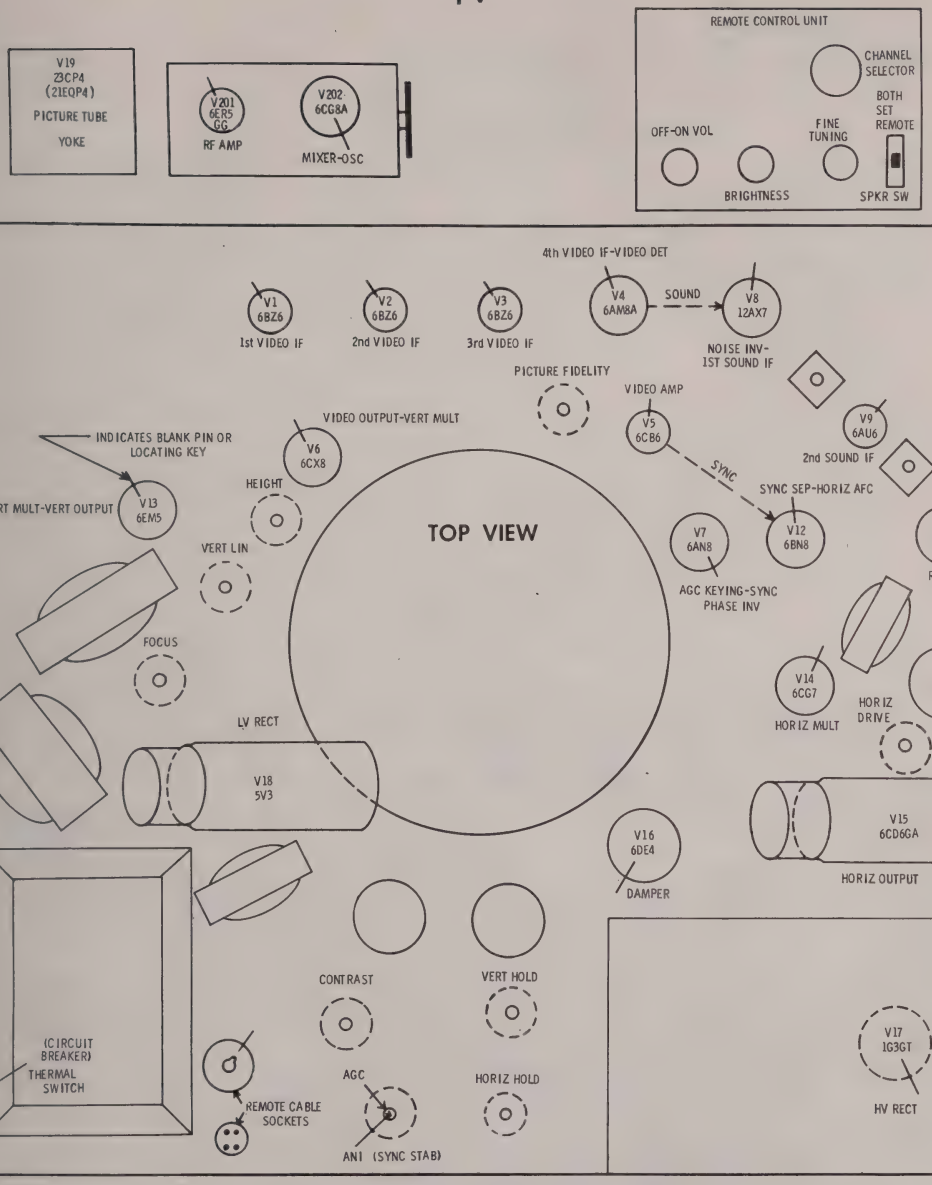
TUBE PLACEMENT CHART
TV



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound Thermal Switch (Circuit Breaker), V18

SWEEP FAILURE
No raster, has sound V14, V15, V16, V17, V19
No vertical deflection V8, V13
Poor vert. linearity or foldover V6, V13
Poor horiz. linearity or foldover V14, V15, V16
Narrow picture V14, V15, V16, V18
Vert. off freq. V6, V13
Horiz. off freq. V14

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V5, V6, V19
Has pic, no sound V8, V9, V10, V11, V26, V27, & Amp. Ch. DPA-20
Overloaded picture V7

SYNC FAILURE
No vert. sync V7, V12
No horiz. sync V7, V12
No vert. or horiz. sync V7, V12

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools:

A1 thru A9, A11	GENERAL CEMENT #8721, 8722 WALSCO #2519
A10	GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987 WALSCO #2531
A13, A14	GENERAL CEMENT #8282, 8606, 8606L, 9295 WALSCO #2526, 2543, 2544, 2545
Mixer Plate Coil	GENERAL CEMENT #9296. 9297 WALSCO #2546, 2547

VIDEO IF ALIGNMENT

Remove the Noise Inverter tube (12AX7, V8).
Connect the negative lead of a 6 volt bias supply to point Ⓐ. Positive to chassis.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	47.25MC (Unmod)	Any non-interfering channel	DC probe thru 10K to point Ⓑ. Common to chassis. (Across Video Det. load)	A1, A2	Set generator output at maximum. Adjust for MINIMUM deflection.
2.		"	39.75MC	"	"	A3	"
3.		"	41.25MC	"	"	A4	"
4.		"	43.3MC	"	"	A5	Use only enough generator output to provide a usable indication on VTVM. Adjust for maximum deflection.
5.		"	45.0MC	"	"	A6	"
6.		"	42.5MC	"	"	A7	"
7.		"	45.75MC	"	"	A8	"
8.		"	43.0MC	"	"	A9	"
9.		"	45.0MC	"	"	Mixer Plate Coil	"

OVERALL VIDEO IF RESPONSE CHECK

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Connect high side of a separate signal generator to ground lead of IF input cable to provide markers. DO NOT connect low side of generator.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	63MC (10MC Swp)	41.25MC 43.0MC 45.0MC 45.75MC 47.25MC	3	Vert. Amp. thru 22K to point Ⓑ. Low side to chassis. DC probe of VTVM to point Ⓒ. Common to chassis.		Adjust sweep output to develop -4 volts or less on AGC line as indicated by VTVM. Check for response curve similar to Fig. 1 with markers as shown. If necessary, retouch Mixer Plate Coil to position 45.75MC marker at 50%, A7 to position 43.0MC marker at corner of curve and A8 and A5 for correct tilt, dip or hump. A8 will affect higher frequency part and A5 the lower frequency. **Replace V8.**

4.5MC TRAP ALIGNMENT

Remove Video Detector tube from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.01mfd	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	RF probe to point Ⓓ. Common to chassis.	A10	Adjust for MINIMUM deflection. Replace Video Det. tube in its socket.

SOUND IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12.	.01mfd	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point Ⓔ. Common to chassis.	A11, A12, A13	Adjust for maximum deflection.
13.	"	"	"	"	DC probe to point Ⓕ. Common to point Ⓖ.	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

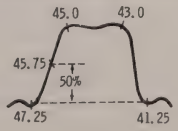
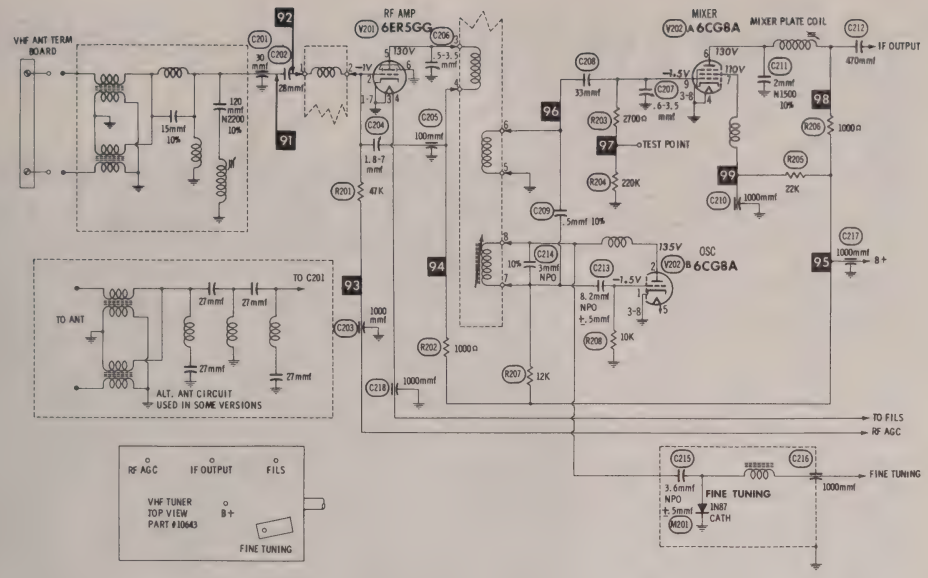


FIG. 1



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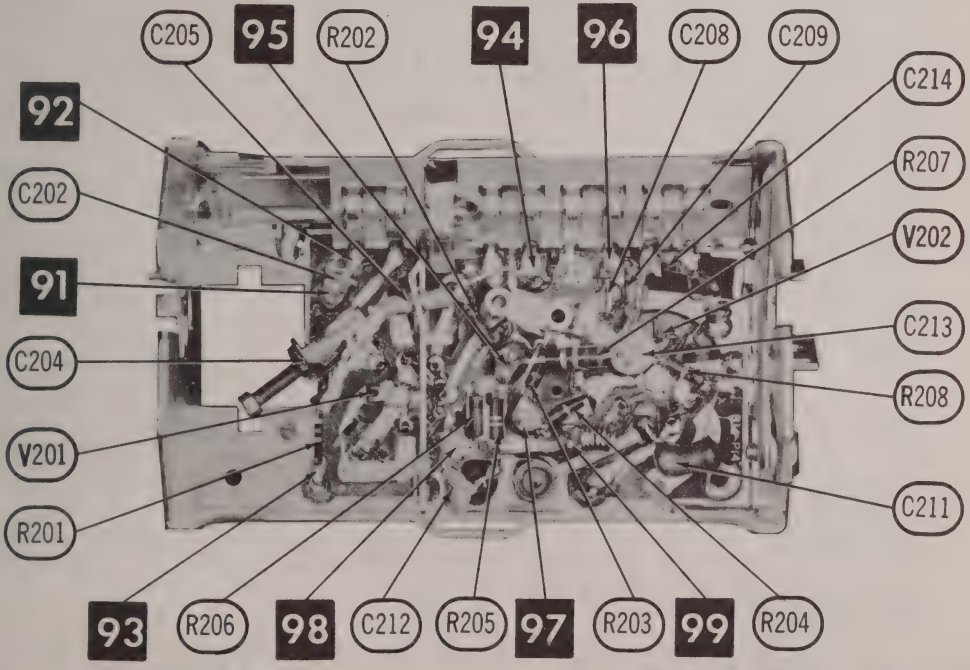
VHF TUNER 10643



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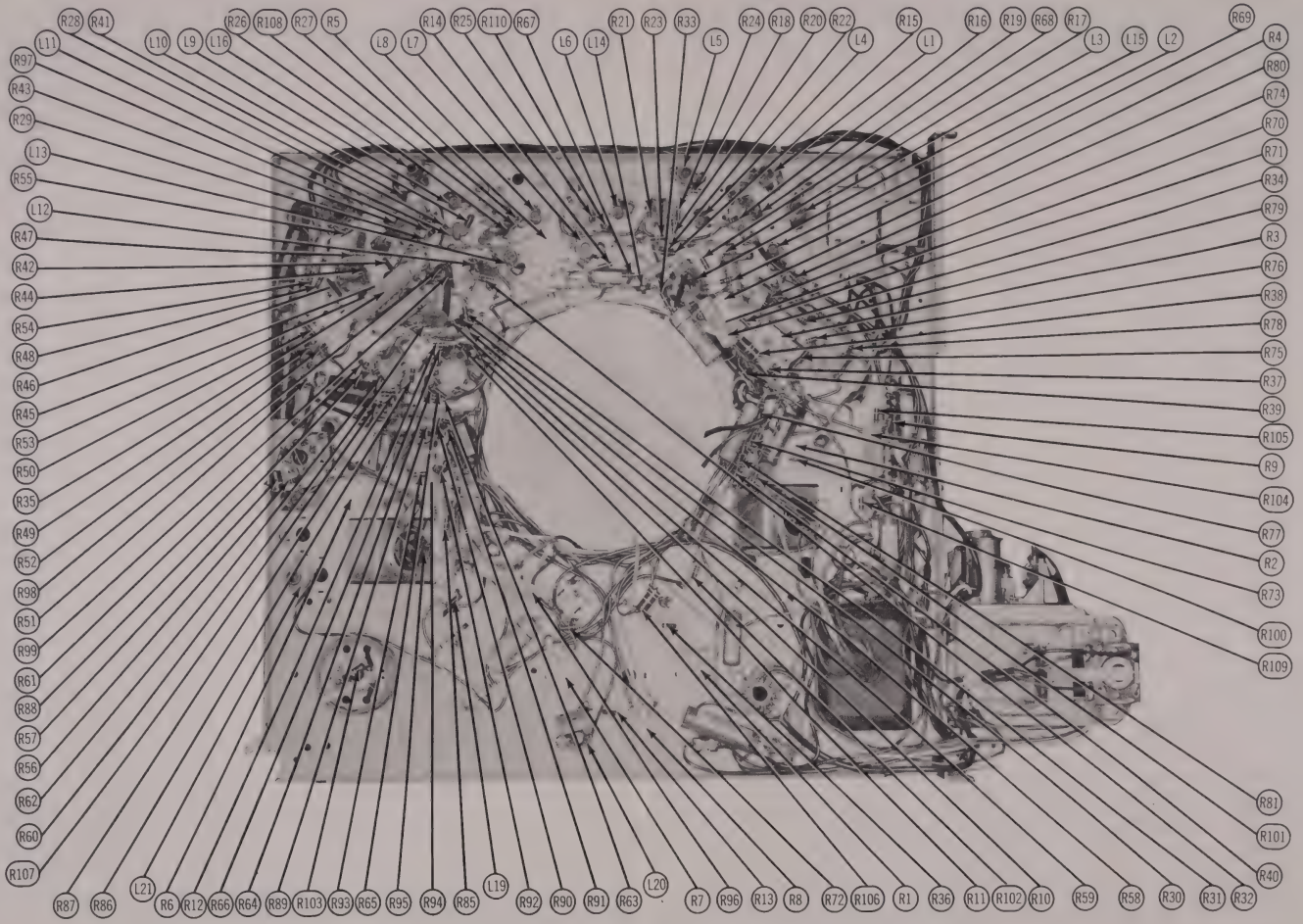
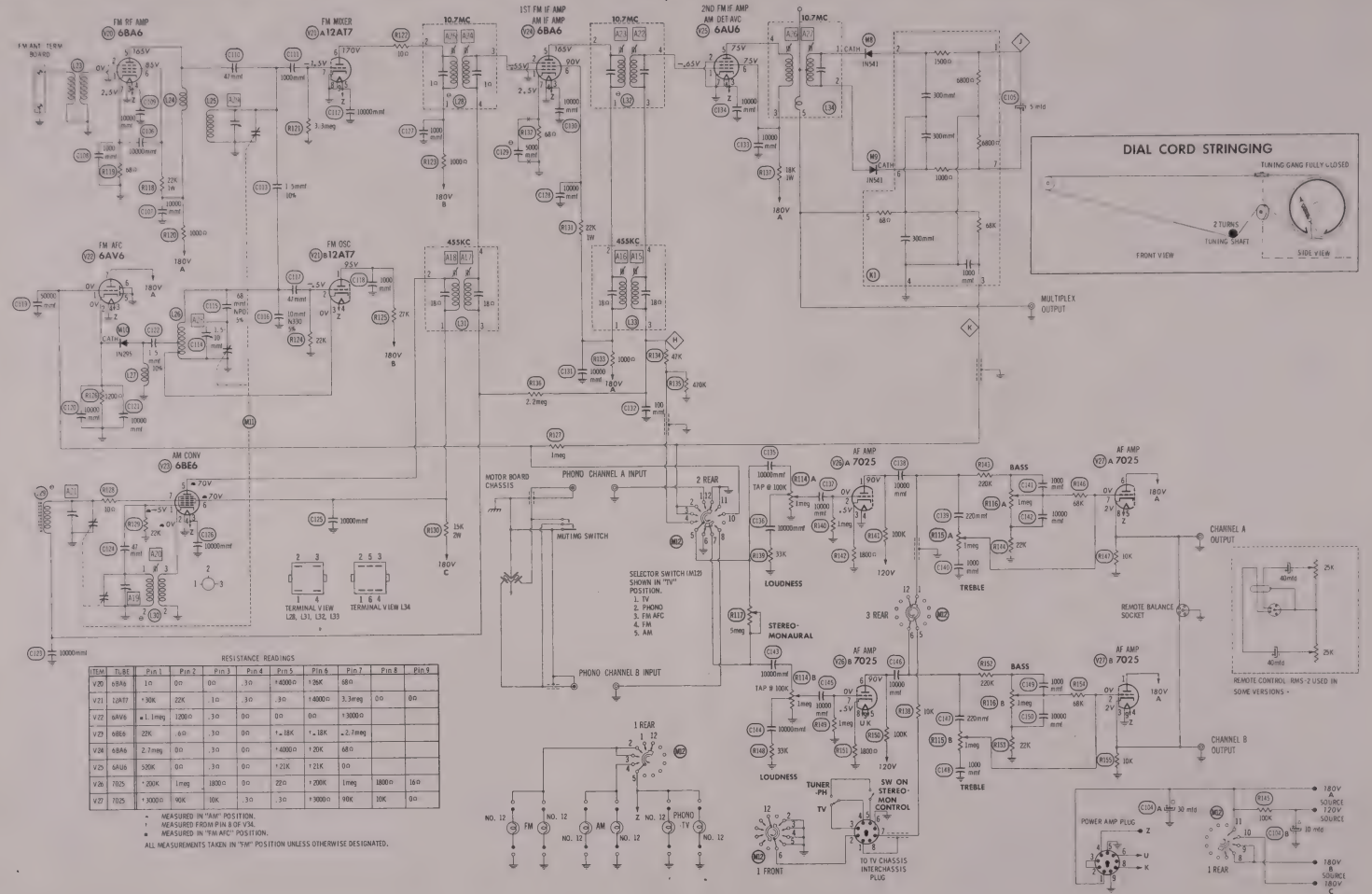
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

VHF TUNER 10643 - BOTTOM VIEW

SET 494 FOLDER 2



TV CHASSIS BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V20	6BA6	1Ω	0Ω	0Ω	3Ω	+4000Ω	+26K	68Ω		
V21	12AT7	+30K	22K	1Ω	3Ω	3Ω	+4000Ω	3.3meg	0Ω	0Ω
V22	6AV6	▪1.1meg	1200Ω	3Ω	0Ω	0Ω	0Ω	+3000Ω		
V23	6BE6	22K	6Ω	3Ω	0Ω	+_18K	+_18K	+2.7meg		
V24	6BA6	2.7meg	0Ω	3Ω	0Ω	+4000Ω	+20K	68Ω		
V25	6AU6	520K	0Ω	3Ω	0Ω	+21K	+21K	0Ω		
V26	7025	+200K	1meg	1800Ω	0Ω	22Ω	+200K	1meg	1800Ω	16Ω
V27	7025	+3000Ω	90K	10K	3Ω	3Ω	+3000Ω	90K	10K	0Ω

- MEASURED IN "AM" POSITION.
+ MEASURED FROM PIN 8 OF V34.
▪ MEASURED IN "FM AFC" POSITION.
ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.

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FM AM TUNER CHASSIS 8TU-2 & REMOTE CONTROL BALANCE CHASSIS RMS-2

FM-AM ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Use only enough generator output to provide a usable indication.
Suggested Alignment Tools: A15 thru A18 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8729, 8987, 8988, 8989
WALSCO #2515, 2531, 2532
A19, A21, A28, A29 . GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A22 thru A25 ..... GENERAL CEMENT #8721, 8722
WALSCO #2519
A20, A26, A27 ..... GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545

AM ALIGNMENT - SELECTOR IN AM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	High side thru .01mfd to pin 7 (grid) of AM Conv. Low side to chassis.	455KC (400∿ Mod.)	AM Tuning gang fully open	DC probe to point (H). Common to chassis.	A15, A16, A17, A18	Adjust for maximum deflection.
2.	Loop	1620KC	"	"	A19	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	530KC	Tuning gang fully closed	"	A20	Adjust for maximum deflection. Repeat steps 2 and 3.
4.	"	1500KC	Tune to 1500KC signal	"	A21	Adjust for maximum deflection.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM - SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	High side thru .01mfd to pin 7 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	FM Point of non-interference	DC probe to point (H). Common to chassis.	A22, A23 A24, A25	Adjust for maximum deflection.
6.	"	"	"	DC probe to point (J). Common to chassis.	A26	"
7.	"	"	"	DC probe to point (K). Common to chassis.	A27	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE - SELECTOR IN FM POSITION

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	High side thru .01mfd to pin 7 (grid) of FM Mixer. Low side to chassis.	10.7MC (450KC Swp.)	FM Point of non-interference	Vert. Amp. to point (H). Low side to chassis.	A22, A23 A24, A25	Adjust for maximum gain and symmetry of response similar to Fig. 2 with marker as shown.
6.	"	"	"	Vert. Amp. to point (J). Low side to chassis.	A26	Disconnect stabilizing capacitor C105. Adjust for maximum gain and symmetry of response similar to Fig. 2 with marker as shown. Reconnect C105.
7.	"	"	"	Vert. Amp. to point (K). Low side to chassis.	A27	Adjust to place marker at the center of crossover lines similar to Fig. 3. SLIGHTLY retouch A26 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT - SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	Across FM antenna terminals with 150Ω in each lead.	106MC (Unmod.)	FM 106MC	DC probe to point (H). Common to chassis.	A28, A29	Adjust for maximum deflection.
9.	"	92MC	92MC	"	L25, L26	Adjust by expanding or compressing coil turns for maximum deflection. Repeat steps 8 and 9.

FIG. 2

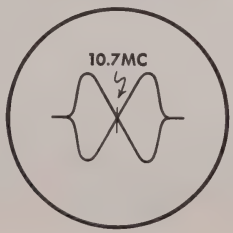
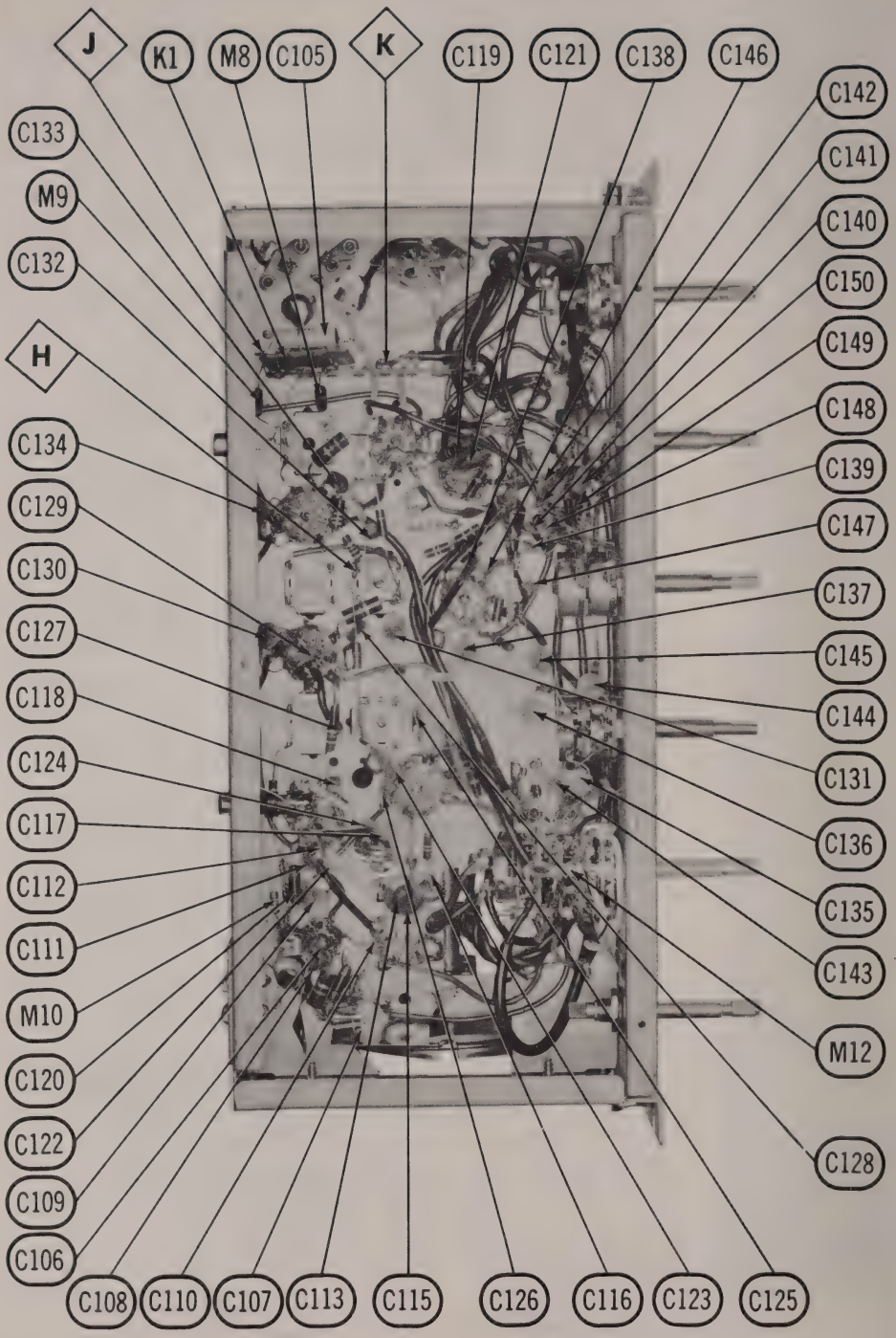
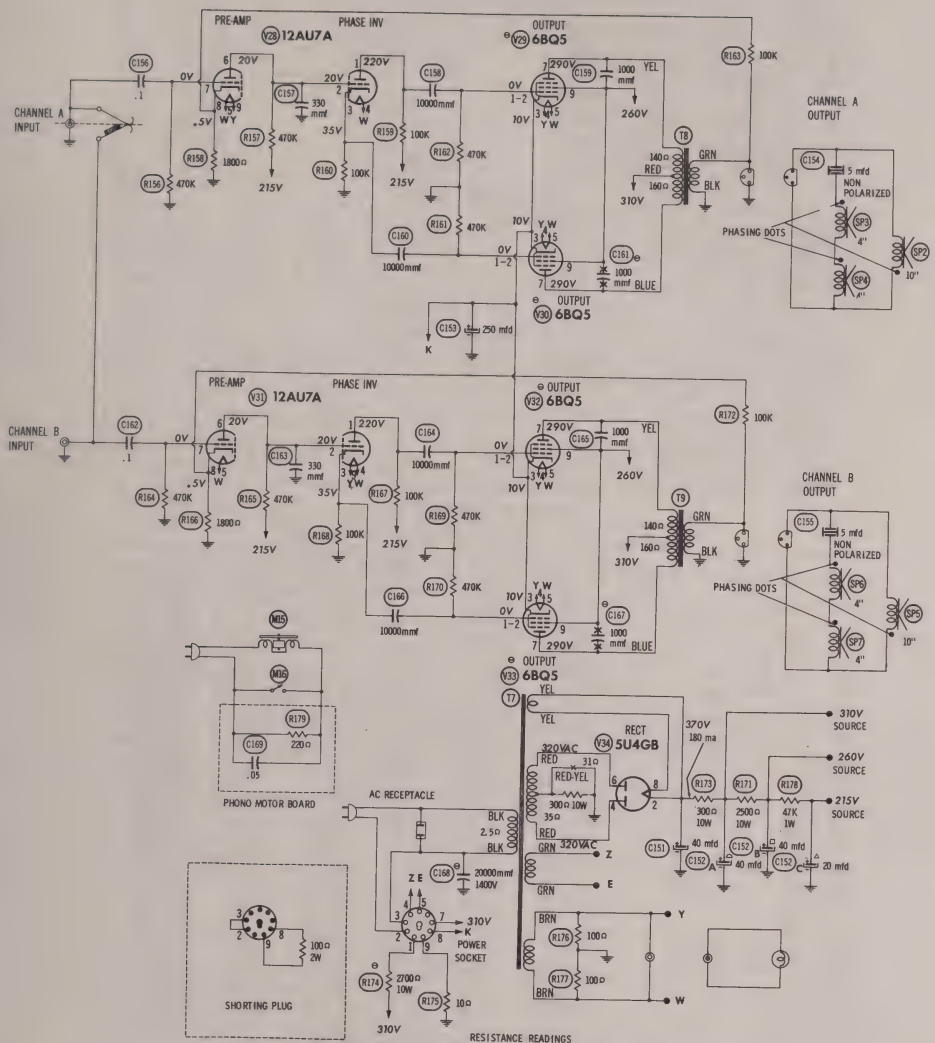


FIG. 3



FM AM TUNER BOTTOM VIEW - CAPACITOR & MISC. IDENT.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V28	12AU7A	†150K	†520K	100K	50Ω	50Ω	†520K	470K	1800Ω	50Ω
V29	6BQ5	470K	470K	22Ω	50Ω	50Ω	NC	†440Ω	NC	†2800Ω
V30	6BQ5	470K	470K	22Ω	50Ω	50Ω	NC	†460Ω	NC	†2800Ω
V31	12AU7A	†150K	†520K	100K	50Ω	50Ω	†520K	470K	1800Ω	50Ω
V32	6BQ5	470K	470K	22Ω	50Ω	50Ω	NC	†440Ω	NC	†2800Ω
V33	6BQ5	470K	470K	22Ω	50Ω	50Ω	NC	†460Ω	NC	†2800Ω
V34	5U4GB	NC	¶	NC	35Ω	NC	31Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM PIN 8 OF V34. NC NO CONNECTION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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STEREO AMP CHASSIS DPA-20

SET 494 FOLDER 2

TV PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	1st Video IF Amp.	6BZ6	V9	2nd Sound IF Amp.	6AU6
V2	2nd Video IF Amp.	6BZ6	V10	Ratio Det. - AF Amp.	6BN8
V3	3rd Video IF Amp.	6BZ6	V11	Audio Output	6V6GT
V4	4th Video IF Amp. - Video Det.	6AM8A	V12	Sync Sep. - Horiz. AFC	6BN8
V5	Video Amp.	6CB6	V13	Vert. Mult. - Vert. Output	6EM5
V6	Video Output - Vert. Mult.	6CX8	V14	Horiz. Mult.	6CG7
V7	AGC Keying - Sync Phase Inverter	6AN8	V15	Horiz. Output	6CD6GA
			V16	Damper	6DE4
V8	Noise Inverter - 1st Sound IF Amp.	12AX7	V17	HV Rect.	1G3GT
			V18	LV Rect.	5V3

PICTURE TUBE

ITEM No.	REPLACEMENT DATA					NOTES
	Packard-Bell PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
V19	23CP4 21EQP4		23CP4 ① 21EQP4 ①		23CP4 ② 21EQP4 ②	① Aluminized ② Silver Screen "85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Packard-Bell PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	■100	350	24166	AFH2-41-50	B0332	FP227.7	TMS-61 TD-100-450	TVL-2641	
B	■100	350							
C2A	■140	350	24158	AFH3-29-75	D0044	FP228.3	TMS-62 TD-20-350	TVLS-2642 *	
B	▲20	350							
C3	5	50	24038	PRS1310	BBR5-50	TT50X5	TD-5-50	TVA-1303	
C4	25	25	24006A	PRS1260	BBR25-25	TC26	TD-25-25	TVA-1205	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REMARKS	REPLACEMENT DATA					
				AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C6	.1	200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C7	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C8	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C9	1.0	100V		P288N-1.0		CUB2W1		GEM-21	2TM-M1
C10	22	NPO 10%		NPO-DI 22	DTZ-22	C10Q22C	CCTO-220	CNO-422	10TCC-Q22
C11	12	NPO 5%			TCZ-12	C10Q12C	CM-19B-120J	CNO-412	10TCC-Q12
C12	22	5%		1469-000022	TCZ-22	22R5Q22	CM-19B-220J	CNO-422	MS-422
C13	100	NPO 5%			TCZ-100	C10T1C	CM-19B-101J	CNO-310	10TCC-T10
C14	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C15	2.2	NPO		NPO-SI 2.2	TCZ-2R2	C10V22C	CCTO-2R2	CNO-522	10TCC-V22
C16	22	5%		1469-000022	TCZ-22	22R5Q22	CM-19B-220J	CNO-422	MS-422
C17	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C18	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C19	2.2	NPO ±.25mmf		NPO-DI22	DTZ-2R2	C10V22C	CCTO-2R2	CNO-522	10TCC-V22
C20	22	5%		1469-000022	TCZ-22	22R5Q22	CM-19B-220J	CNO-422	MS-422
C21	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C22	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C23	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C24	2.2	NPO		NPO-SI 2.2	TCZ-2R2	C10V22C	CCTO-2R2	CNO-522	10TCC-V22
C25	30	5%		1469-00003	TCZ-30	22R5Q3	CM-19B-300J	CNO-433	MS-43
C26	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C27	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C28	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C29	1000			BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C30	10	NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C31	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C32	10	NPO 5%		NPO-DI 10	DTZ-10	C10Q1C	CM-19B-100J	CNO-410	10TCC-Q10
C33	5000			BPD-005	DD-502	BYA10D5	CCD-502	GP250	5HK-D50
C34	.1	600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C35	330			BPD-00033	DD-331	L10T33	CCD-331	GP333	10TS-T33
C36	.1	600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C37	.1	400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C38	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C39	.047	600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C40	.01	600V		P688N-01	D6-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C41	470			BPD-00047	DD-471	BYA10T47	CCD-471	GP347	10TS-T47
C42	75	N750		N750-DI 75	DTN-75	C10Q75U	CCTN-750	CN7-475	10TCU-Q75
C43	100	NPO 5%			TCZ-100	C10T1C	CM-19B-101J	CNO-310	10TCC-T10
C44	5			SI 5	D6-050	L10V5	CCD-050	GP550	10TS-V50
C45	15	NPO 10%		NPO-DI 15	DTZ-15	C10Q15C	CCTO-150	CNO-415	10TCC-Q15
C46	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C47	200	10%		1469-0002	TCZ-200	22R5T2	CM-19B-201K	MCB237	MS-320
C48	5000			BPD-005	DD-502	BYA10D5	CCD-502	GP250	5HK-D50
C49	47	NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CCTO-470	CNO-447	10TCC-Q47
C50	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C51	1500	10%		DI-1500	DD-152	1R5D15	CCD-152	GP215	10TS-D15
C52	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C53	1200	10%		DI-1200	DD-122	1R5D12	CCD-122	GP212	10TS-D12
C54	2000			BPD-002	DD-202	BYA10D2	CCD-202	GP220	5HK-D20
C55	.1	200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C56	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C57	.022	400V		P488N-022	DD-203	CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C58	.1	600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C59	.022	400V		P488N-022	DD-203	CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C60	.0047	600V		P688N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C61	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C62	.047	200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C63	10000			BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C64	.1	200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C65	470			SI 470	D6-471	BYA10T47	CCD-471	GP347	10TS-T47

TV PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C66	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C67	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C68	.01 600V		P688N-01	D6-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C69	.0033 600V 10%		V84C6D33-10%		PM6D33	6DP-1-332	GEM-16233	6TM-D33
C70	.0022 400V 10%		V84C6D22-10%		PM6D22	6DP-1-222	GP222	6TM-D22
C71	.001 1000V 10%			DD-102		16DP-1-102	GEM-1621	10TM-D1
C72	.033 600V	Note 1	P688N-033	DD-303	CUB6S33	6DP-3-333	GEM-6133	6TM-S33
C73	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C74	.033 600V		P688N-033	DD-303	CUB6S33	6DP-3-333	GEM-6133	6TM-S33
C75	68 NPO 5%			DTZ-68	C10Q68C	CM-19B-680J	CNO-468	10TCC-Q68
C76	68 NPO 5%			DTZ-68	C10Q68C	CM-19B-680J	CNO-468	10TCC-Q68
C77	.0047 600V		P688N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C78	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C79	.001 600V 10%		V84C6D1-10%	DD-102	PM6D1	6DP-1-102	GEM-1621	6TM-D1
C80	4000 10%		1464-004		1R5D4	CM-20B-392K	MCB463	MS-24
C81	91 NPO 5%			DTZ-100	C10Q91C	CM-19B-910J	CNO-310	10TCC-T10
C82	470 5%		1469-00047		5R5T47	CM-19B-471J	MCJ244	MS-347
C83	330 10%		1469-00033		5R5T33	CM-19B-331K	MCB241	MS-333
C84	.0022 400V 10%		V84C4022-10%		PM6D22	6DP-1-222	GP222	6TM-D22
C85	.0022 600V		P688N-0022	D6-222	CUB6D22	6DP-1-222	GEM-6222	6TM-D22
C86	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C87	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C88	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C89	150 2500V		HVD-30-150	DD30-151	HVB30T15	3CCD-151	6HV-315	30GA-T15
C90	150 2500V		HVD-30-150	DD30-151	HVB30T15	3CCD-151	6HV-315	30GA-T15
C91	.033 1000V 10%					16DP-4-333	GEM-1613	10TM-S3
C92	120 2000V			DD30-120	HVB20T12	3CCD-121	2HV-312	30GA-T12
C93	120 2000V			DD30-120	HVB20T12	3CCD-121	2HV-312	30GA-T12
C94	100 2000V			DD30-100	HVB20T1	3CCD-101	2HV-310	30GA-T10
C95	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C96	2000		BPD-002	DD-202	BYA10D2	CCD-202	GP220	5HK-D20
C97	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C98	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C99	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C100	.47 200V		P288N-47		CUB2P47	2DP-5-474	GEM-2047	2TM-P47
C101	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1

Note 1. .047 used in early production models (with Vert. Out. Trans. #89480B).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	1000Ω	½	25904A	B-505	A47-1000-S	Q17-108	U3	Contrast
B	Shaft			Not Req.	FKS-½	Not Req.	Not Req.	
R2A	3meg	½	25867	BX-84	B47-3meg-S	B11-140	SU-59	Focus
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R3A	3meg	½	25867	BX-84	B47-3meg-S	B11-140	SU-59	Vert. Linearity
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R4A	5meg	½	25910	AB-87	B47-5meg-S	B11-141	PTA56L	Height
B	Shaft			AK-19	Not Req.	TM4	Not Req.	
R5A	50K	½	25946	B-32	A47-50K-Z	Q13-123	U33	Picture Fidelity
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R6A	50K	½	25908	BX-31	B47-50K-S	B11-123	PTA54L	Horiz. Drive
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R7A	3meg	½	25984	BX-84	A47-3meg-S	Q11-140	U-59	Vert. Hold
B	Shaft			Not Req.	FKS-½	Not Req.	Not Req.	
R8A	150K	½	25968	F1-32		† (QJ-981	■ (UE3912	ANI
B	50K	½		R2-29				AGC

† "Concentrikit" Equivalent: K-8 Kit with Base Elements and Shafts: B11-328, P19-012,(Panel)
(Not available as a factory assembled unit.) B11-123, R15-005 (Rear)
R-5 (Retainer)

■ "STA-LOC" Equivalent: FB154L, RU54L, OS500, IS437.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R9	1meg	
R10	1.5meg	
R11	270K	
R12	3300Ω	
R13	15K	
R14	120Ω	
R15	120Ω	
R16	10K	
R17	270Ω	
R18	470Ω	
R19	56Ω	
R20	4700Ω	
R21	470Ω	
R22	120K	
R23	120K	
R24	100Ω	
R25	56Ω	
R26	1000Ω	
R27	180Ω	
R28	560Ω	
R29	2200Ω	
R30	1500Ω	
R31	1200Ω	
R32	68Ω	
R33	220K	
R34	3900Ω 7W	#73715
R35	3000Ω 10W	#73730
R36	100Ω	
R37	100K	
R38	82K 2W	

ITEM No.	RATING	REMARKS
R39	220K	
R40	3.3meg	
R41	100K	
R42	1000Ω	
R43	68Ω	
R44	100K	
R45	3300Ω	
R46	15K	
R47	120Ω	
R48	10K	
R49	12K	
R50	12K	
R51	1meg	
R52	220K	
R53	220K	
R54	56K	
R55	22K	
R56	470K	
R57	560Ω 2W	
R58	47K	
R59	22K	
R60	270K	
R61	150K	
R62	4.7meg	
R63	150K	
R64	1meg	
R65	10K	
R66	3300Ω	
R67	22K	
R68	68K	

ITEM No.	RATING	REMARKS
R69	33K	
R70	2.2meg	
R71	1meg	
R72	3.3meg	
R73	4.7meg	
R74	470K	Note 1
R75	1meg	
R76	470K	
R77	3300Ω	
R78	22K	
R79	33K	
R80	27K	
R81	15K	
R82	220Ω	
R83	220Ω	
R84	3.2Ω (Cold)	
R85	4700Ω	
R86	1meg	
R87	1meg	
R88	560Ω	
R89	470K	
R90	47K	
R91	6800Ω 1W	
R92	1200Ω	
R93	100K	
R94	150K	
R95	560K	
R96	12K 10W	#73705
R97	47K	
R98	33K	

TV PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING	REMARKS
R99	100K	
R100	100K	Note 3
R101	1 3meg	
R102	33K	Note 3

ITEM No.	RATING	REMARKS
R103	2.2Ω	
R104	3900Ω TW	#73715
R105	8.2meg	
R106	470Ω 2W	

ITEM No.	RATING	REMARKS
R107	10Ω	
R108	12K	
R109	100K	
R110	10K	

Packard-Bell Part Number

Note 1. 1 meg used in early production models with Vert. Output Trans. (Part #89480B).
Note 2. 390K used in early production models.
Note 3. Not used in early production models with Horiz. Output Trans. (Part #89488A).

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: Packard-Bell PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	39.75MC Trap	29864A	17-4534	17-4536	TV-153	6225		
L2	1st Video IF	29864	17-4534	17-4534	TV-131	6226	VF-4	
L3	47.25MC Trap	29864A	17-4536	17-4536	TV-153	6225		
L4	2nd Video IF	29865	17-4533	17-4533	TV-130	6219	VF-3	
L5	47.25MC Trap	29864A	17-4536	17-4536	TV-153	6225		
L6	3rd Video IF	29866	17-4533	17-4533	TV-130	6219	VF-3	
L7	41.25MC Trap	29865A	17-4536	17-4536	TV-131	6225	VF-4	
L8	4th Video IF	29865	17-4533	17-4533	TV-130	6219	VF-3	
L9	5th Video IF	29867B	17-4533	17-4533	TV-130	6219	VF-3	
L10	RF Choke	29868	18-1008	18-1008	BC-868	4823		18uh
L11	Shunt Peaking Coil	29869	19-3260	19-3260	TV-186	6181	VP-8	280uh
L12	Series Peaking Coil	29523 ①	19-3092 *	19-3092 *	TV-181 *	6177 *	VP-3 *	93uh
L13	4.5MC Trap	29548A	17-3402 †	17-3402 †	TV-119 †	1470 †	SF-3	
L14	Series Peaking Coil	29506 ②	19-4122	19-4122	TV-182	6178	VP-4 ▲	130uh
L15	Shunt Peaking Coil	29508 ②	19-4180	19-4180	TV-183	6179	VP-5 ■	180uh
L16	1st Sound IF	29863C	17-3400	17-3400	TV-181	1469 †	SF-3	
L17	2nd Sound IF	29878A	17-3400 *	17-3400 *	TV-181 *	1469 †*	SF-3	
L18	Ratio Det.	29894	17-3477	17-3477	TV-133-B	1496RD		
L19	RF Choke	33646	18-1010	18-1010	BC-866	4823		13uh

① Wound on 3900Ω Resistor.
② Wound on 22K Resistor.
③ Wound on 39K Resistor.

* Parallel with 3900Ω Resistor.
▲ Parallel with 22K Resistor.
■ Parallel with 39K Resistor.

† Disregard Tap.
• Use original capacitor and shield.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: Packard-Bell PART No.	Halderson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	NOTES
L20	74Ω		29703	HS-7	TV-185 †	6211 †	H-102	HS-7	Horiz. Stabilizer † Disregard Tap

COILS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: Packard-Bell PART No.	Halderson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L21	Width (3-17MH) ①	29718	WC-28 ③	MWC-11	6329 ③	20IR16	QRC109 ④	WC-11 ④	WC-28 ③	WLC-5

① Not used in early production models.
② Use Black and White terminals.

③ Do not use Tap.
④ Drill new mounting hole(s).

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	RATINGS: DC RES	RATINGS: INDUCTANCE @ CURRENT 1000 ~	REPLACEMENT DATA: Packard-Bell PART No.	Halderson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L23	.330A	40Ω	.85 Hy.	27006D	26C44 ①	C-2996 ①	F-80I ①	C-2328 ①	26C44 ①	C-34X

① Drill new mounting hole.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: Packard-Bell PART No.	Halderson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V	540VCT ② .330A	5V ③ 3.8A		29076D						R-72BC ①
	SEC. 3	SEC. 4	SEC. 5								
	6.3V ④ 1A										

① Parallel and phase 5A and 8A (5.3V) winding. Tape 2A (5.3V) winding.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	REPLACEMENT DATA: Packard-Bell PART No.	Halderson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	117V ① .58A	247 ② 1.8A		29060B						R-42BC

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: Packard-Bell PART No.	Halderson PART No.	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T3	Vert. Output	29501	26S14	V319			VO-101	26S14	A-113X
	Alt. Vert. Output	29480B ①	26S14	V319			VO-101	26S14	A-113X
T4	Yoke-Horiz. (18.8MS) (110°)-Vert. (18MS)	29696 ②	Y-83 ③④	Y-110 ③④			DY-27A ③④	Y-52 ③④	Y-80-2 ④
	Rear Cover and Centering Device	34103							YC-110
T5	Horiz. Output	29503		HVO170					
	Alt. Horiz. Output	29488A ⑤							

① Used in early production models.
② Includes R82, R83, C93, C93 and C94.
③ Use original rear cover and centering device.
④ Connect same as original.

⑤ Connect yoke terminal #2 to horizontal output transformer terminal #6; yoke terminals #1 and #3 to resistor R86; yoke terminal #10 to capacitor C91.
⑥ Used in early production models (See Alternate Schematic).

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: Packard-Bell PART No.	Halderson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	4000Ω	3-4Ω	89436F ①	24S04	A-2900	AU-608	A-3877	24S04	S-51X	① Alternate Part #89436D.

MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M1	Tuner	10843	VHF, STANDARD COIL REPLACEMENT Type #GG4290A
M3	Power Tuning Assy.	89060B	Includes Motor Part #58067A, Muting Switch #58067, and Channel Selector Switch #58077
M3	Relay	73018A	Muting
M4	Relay	73018A	Power
M5	Circuit Breaker	89718A	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO	DESCRIPTION
Safety Glass	55090A	Model 21DK3
Mask	55120	Model 21DK3
Mask	55137	Model 23DX3
Knob	52183A	Picture Fidelity
Knob	52257	Contrast, Vertical Hold
Knob	52285B	Selector, Tuning, Dimension (Stereo-Monaural)
Knob	52276C	(Outside) Loudness, Bass, Treble
Knob	52286B	(Inside) Loudness, Bass, Treble
Knob	52217H	Channel Selector
Knob	52230C	Volume, Fine Tuning, Brightness
Dial Glass	38191	Radio Tuning
Pointer	67049B	Radio Dial

WIRING DATA

High Voltage Lead	Use BELDEN No. 8859
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8534 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8235
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8468 (Round) - 5 Conductor 8469 (Round) - 8 Conductor

REMOTE CONTROL PARTS LIST AND DESCRIPTIONS

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C102	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-20I	2TM-P1
C103	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-20I	2TM-P1

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R11A	50K	½	25083	B-32	A47-50K-Z	Q23-123	U33	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KR-3	SWE-4	76-4	U5-28	Power Off-On
R12A	50K	½	25917	B-31	A47-50K-S	Q11-123	U35	Brightness
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R13A	50K	½	25946	B-32	A47-50K-Z	Q23-123	U33	Fine Tuning
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

SPEAKER

ITEM No.	TYPE: SIZE	TYPE: FIELD	TYPE: V. C. IMP.	REPLACEMENT DATA: Packard-Bell PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	21"	PM	3-4Ω	63114	25A07	

MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M6	Switch	88754A	Remote (Set-Remote-Both, 3 Pole, 3 Position, Slide Type)
M7	Switch	88063A	Channel Selector (Rotary Wafer Type)

FM—AM TUNER PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	CBS USE	CBS TYPE	ITEM No.	GENERAL ELECTRIC USE	GENERAL ELECTRIC TYPE	ITEM No.	RAYTHEON USE	RAYTHEON TYPE	ITEM No.	SYLVANIA USE	SYLVANIA TYPE
V20	FM RF Amp.	6BA8	V25	2nd FM IF Amp. - AM Det. - AVC	12AV7	V25	2nd FM IF Amp. - AM Det. - AVC	6AU8			
V21	FM Mixer - Osc.	12AT7	V26	Channel A - Channel B AF Amp.	6AV8	V26	Channel A - Channel B AF Amp.	7025			
V22	FM AFC	6AV8									
V23	AM Converter	6BE6	V27	1st FM IF Amp. - AM IF Amp.	6BA6	V27	1st FM IF Amp. - AM IF Amp.	7025			
V24	1st FM IF Amp. - AM IF Amp.	6BA6									

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: Packard-Bell PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C104A ■ 30		450	34177	AFH2-52	BO410	FP259	TMC-51	TVL-2757	
B ▲ 10		450							
C108	8	50	34384	PWE50005	EC5-50	TT50X5	ML5-50	TE-1903	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C106	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C107	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C108	100			BPD-001	DD-102	BYA10DI	CCD-102	GP210	5HK-D10
C109	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C110	47			BPD-000047	DD-470	L10Q47	CCD-470	GP447	10T8-Q47
C111	1000			BPD-001	DD-102	BYA10DI	CCD-102	GP210	5HK-D10
C112	1.5	10%		NPO-SE1 1.5	TCZ-1R5	C10Y15C		CNO-S15	10TCC-Y15
C113	1.5	10%		NPO-SE1 1.5	TCZ-1R5	C10Y15C	CM-19B-150J	CNO-468	10TCC-Y15
C114	1.5-50		#25430		839-10				
C115	68	NPO 5%			DTZ-68	C10Q68C	CM-19B-680J	CNO-468	10TCC-Q68
C116	82	N330 5%			TCA-10		*		10TCE-Q20
C117	47			BPD-000047	DD-470	L10Q47	CCD-470	GP447	10T8-Q47
C118	1000			BPD-001	DD-102	BYA10DI	CCD-102	GP210	5HK-D10
C119	50000			BPD-05	DD-503	CUB2S5	4DP-3-503	GP150	5HK-S50
C120	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C121	1000			BPD-001	DD-102	BYA10DI	CCD-102	GP210	5HK-D10
C122	1.5	10%		NPO-SE1 1.5	TCZ-1R5	C10Y15C		CNO-S15	10TCC-Y15
C123	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C124	47			BPD-000047	DD-470	L10Q47	CCD-470	GP447	10T8-Q47
C125	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C126	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C127	1000			BPD-001	DD-102	BYA10DI	CCD-102	GP210	5HK-D10
C128	1000			BPD-001	DD-102	BYA10DI	CCD-102	GP210	5HK-D10
C129	5000		Note 1	BPD-008	DD-502	BYA10DS	CCD-502	GP250	5HK-D50
C130	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C131	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C132	100			BPD-0001	DD-101	L10T1	CCD-101	GP2I0	10T8-T10
C133	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C134	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C135	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C136	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C137	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C138	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C139	220			DI-220	DD-221	L10T22	CCD-221	GP322	10T8-T22
C140	1000			BPD-001	DD-102	BYA10DI	CCD-103	GP210	5HK-D10
C141	1000			BPD-001	DD-102	BYA10DI	CCD-103	GP210	5HK-D10
C142	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C143	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C144	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C145	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C146	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10
C147	220			DI-220	DD-221	L10T22	CCD-221	GP322	10T8-T22
C148	1000			BPD-001	DD-102	BYA10DI	CCD-102	GP210	5HK-D10
C149	1000			BPD-001	DD-102	BYA10DI	CCD-102	GP210	5HK-D10
C150	10000			BPD-01	DD-103	BYA10B	CCD-103	GPI10	5HK-S10

Note 1. May not be used in some versions. * Not normally in distributor's stock. Available thru distributor or to manufacturer.
Packard-Bell Part Number.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R14A	1meg	½	25079					Loudness, Channel B
	100K Tap							
B	1meg	½						Loudness, Channel A
	100K Tap							
R15A	1meg	½	25533					Treble, Channel B
B	1meg	½						Treble, Channel A
R16A	1meg	½	25532					Bass, Channel B
B	1meg	½						Bass, Channel A
R17A	5meg	½	25996			S1I-141		Stereo-Monaural
B	Switch					S6T		Push-Pull, Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R118	22K 1W	
R119	68Ω	
R120	1000Ω	
R121	3.3meg	
R122	10Ω	
R123	1000Ω	
R124	22K	
R125	27K	
R126	1200Ω	
R127	1meg	
R128	10Ω	
R129	22K	
R130	15K 2W	

ITEM No.	RATING	REMARKS
R131	22K 1W	
R132	68Ω	
R133	1000Ω	
R134	47K	
R135	470K	
R136	2.2meg	
R137	18K 1W	
R138	10K	
R139	33K	
R140	1meg	
R141	100K	
R142	1800Ω	
R143	220K	

ITEM No.	RATING	REMARKS
R144	22K	
R145	100K	
R146	68K	
R147	10K	
R148	33K	
R149	1meg	
R150	100Ω	
R151	1800Ω	
R152	220K	
R153	22K	
R154	68K	
R155	10K	

FM—AM TUNER
PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Packard-Bell PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L23	FM Ant. Trans.	29426						
L24	RF Choke	29124	19-1000	19-1000	BC-561	4602		luh
L25	FM Mixer Coil	29165						
L26	FM Osc. Coil	29243A						
L27	RF Choke	29124	19-1000	19-1000	BC-561	4602		luh
L28	1st FM IF Trans.	29148 ①	16-3487	16-3487	FM-254	1463		
L29	Loopstick	29364 ②			BC-419			
L30	AM Osc. Coil	29247B ③	14-1074 *	14-1074 *	BC-393	71-OSC		
L31	1st AM IF Trans.	29077	16-6758	16-6758	BC-352	12-C1	RF-1	
L32	2nd FM IF Trans.	29152 ④	16-3487	16-3487	FM-254	1463		
L33	2nd AM IF Trans.	29078	16-6756	16-6756	BC-353	12-C2	RF-2	
L34	Ratio Det.	29084	17-3498	17-3498	FM-255	1465		

① Alternate Part #29164.
② Alternate Part #29360.
③ Alternate Part #29247A.
④ Alternate Part #29167.
* Mount with leads.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Packard-Bell PART No.	REPLACEMENT DATA
K1	Ratio Det. Network	300mmf, 300mmf, 300mmf, 1000mmf, 68Ω, 1000Ω, 1500Ω, 6800Ω, 6800Ω, 68K	23627A	Aerovox PA-694 Centralab PC-342

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Packard-Bell PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M8	1N541 *	72027	1N60	1N60	1N60	* Matched Pair, FM Det. (Pigtail)
M9	1N541 *	72027	1N60	1N60	1N60	
M10	1N295	72028	1N295	1N295	1N295	AFC Diode (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M11	Tuning Gang	23561	FM-AM, 4 Gang, AM Section: Ant. 24mmf-324mmf Osc. 14mmf-120mmf
M12	Switch	86073	Function, Rotary-Wafer

AMP PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V28	Channel A AF Amp. - Phase Inverter	12AU7A
V29	Channel A Output	6BQ5 (EL84) *
V30	Channel A Output	6BQ5 (EL84) *

ITEM No.	USE	TYPE
V31	Channel B AF Amp. - Phase Inverter	12AU7A
V32	Channel B Output	6BQ5 (EL84) *
V33	Channel B Output	6BQ5 (EL84) *
V34	Rectifier	5U4GB

* Alternate.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Packard-Bell PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C151	40	450	24143A	PRS1750	BR4045	TC78	TD-40-450	TVA-1712	
C152A ▲	40	450	24147	AFH3-43-50	C0344	FP376.9	TMT-39	TVL-3786	
B ■	40	450							
C ▲	20	450							
C153	250	25	24144	PRS1280	BR2502	TC50025	TD-250-25	TVA-1208	
C154	5	25NP	24146	NP-PRS7550	BBR10-25 †	TCN504		TVANS-1203.1*	
C155	5	25NP	24146	NP-PRS7550	BBR10-25 †	TCN504		TVANS-1203.1*	

† Use 2 units. Connect negative terminals together.
Connect positive terminals into circuit the same as the original non-polarized unit.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C156	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C157	330		BPD-00033	DD-331	L10T33	CCD-331	GP333	10TS-T33
C158	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C159	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C160	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C161	1000	Note 1	BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10

AMP PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C162	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C163	330		BPD-00033	DD-331	L10T33	CCD-331	GP333	10TS-T33
C164	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C165	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C166	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C167	1000	Note 1	BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C168	20000 1400V	Note 2			CUB16S2	16DP-4-203	GEM-1612	MB-S2
C169	.05 600V		P688N-05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5

Note 1. May not be used in early production models.
Note 2. Early models use a dual 10000mmf in this application.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R156	470K	
R157	470K	
R158	1800Ω	
R159	100K	
R160	100K	
R161	470K	
R162	470K	
R163	100K	

ITEM No.	RATING	REMARKS
R164	470K	
R165	470K	
R166	1800Ω	
R167	100K	
R168	100K	
R169	470K	
R170	470K	
R171	2500Ω 10W	

ITEM No.	RATING	REMARKS
R172	100K	
R173	300Ω 10W	#73615
R174	2700Ω 10W	Note 1
R175	10Ω	
R176	100Ω	
R177	100Ω	
R178	47K 1W	
R179	220Ω	

Note 1. Some versions may use 2700Ω 7W (Part #73713). #Packard-Bell Part Number

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Packard-Bell PART No.	Halldprson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T7	117V @ 1.3A	640VCT @ .180A	5V @ 3A	89083B						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 3.6A	6.3V @ 2.3A								

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Packard-Bell PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordorson PART No.	Triad PART No.	
T8	7100Ω CT	6-8Ω	89460A	24S14	A-2901 ①	AU-609	A-3870	24S14	S-55X	① Drill new mounting hole.
T9	7100Ω CT	6-8Ω	89460A	24S14	A-2901 ①	AU-609	A-3870	24S14	S-55X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Packard-Bell PART No.	QUAM PART No.	
SP2	10"	PM	6-8Ω	83711D	10A6AZ7.6	
SP3	4"	PM	6-8Ω	83110B	4A15Z6.8	
SP4	4"	PM	6-8Ω	83111B	4A15Z7.2	
SP5	10"	PM	6-8Ω	83711D	10A6AZ7.6	
SP6	4"	PM	6-8Ω	83110B	4A15Z6.8	
SP7	4"	PM	6-8Ω	83111B	4A15Z7.2	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA								
	Packard-Bell PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M13	63045 *	13TB		26S	S1-1 S3-3			8TA4-S	N-8TA-S

* Alternate Part #63046 or #63042.

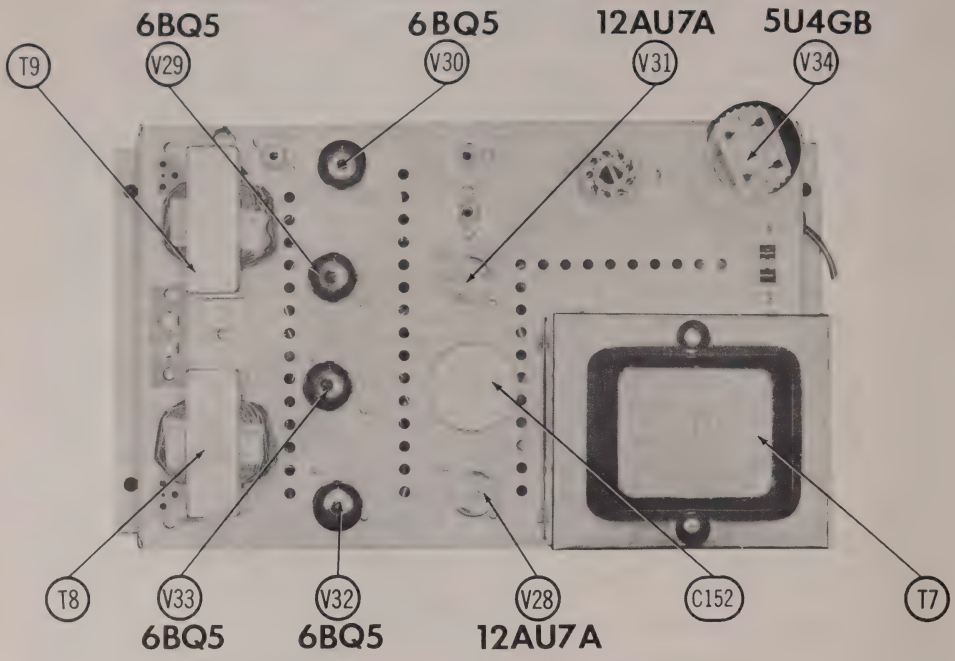
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

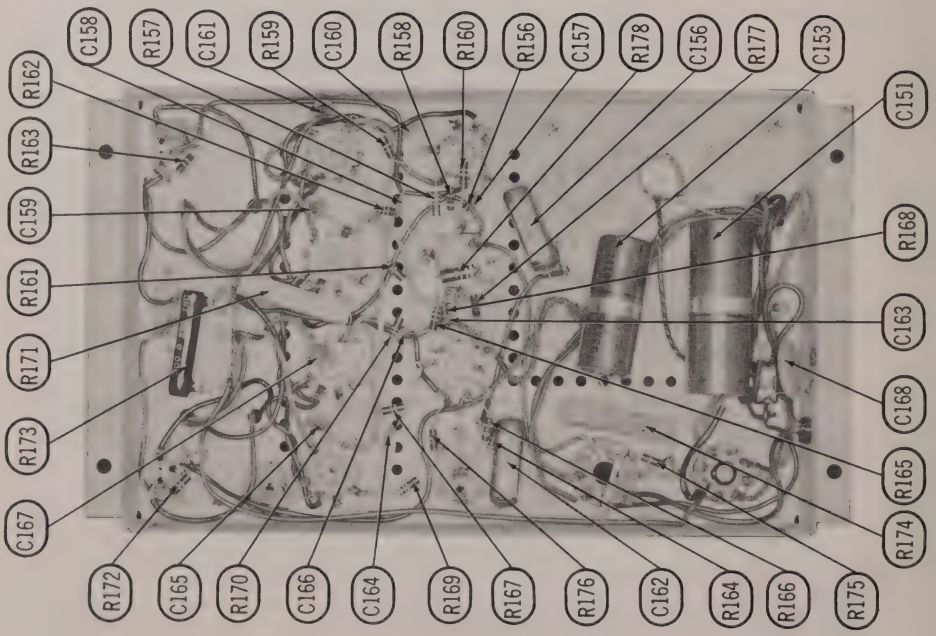
ITEM No.	REPLACEMENT DATA			REMARKS
	Packard-Bell PART No.	CLEVITE WALCO PART No.	JENSEN PART Nc	
M14	78	W-101STS † or W-101STD ♦	E98 † or E98D ♦	† Jewel ♦ Diamond
	LP	W-102MGS † or W-102MGD ♦	E98X † or E98XD ♦	

MISCELLANEOUS

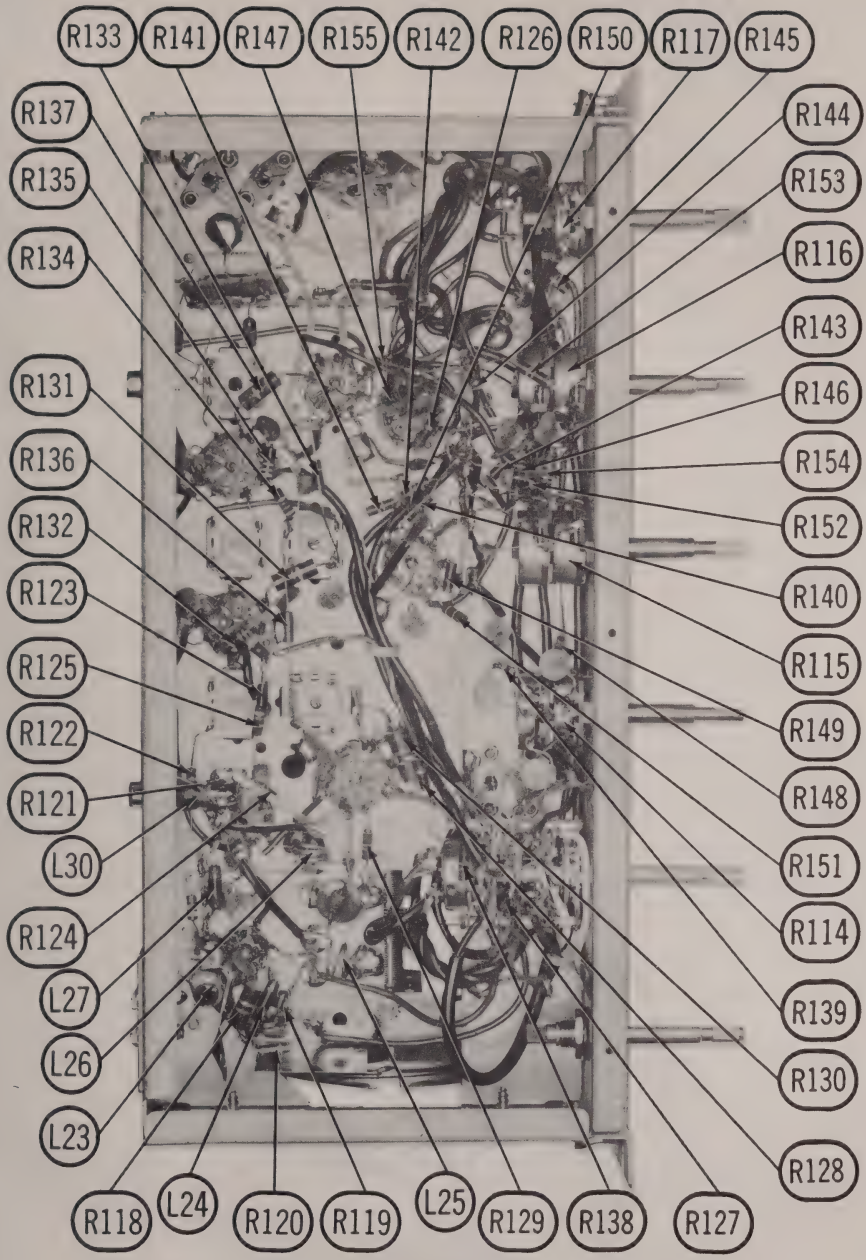
ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M15	Motor		Phono Drive (Part of Changer)
M16	Switch		Off-On (Part of Changer)



STEREO AMP. CHASSIS - TOP VIEW

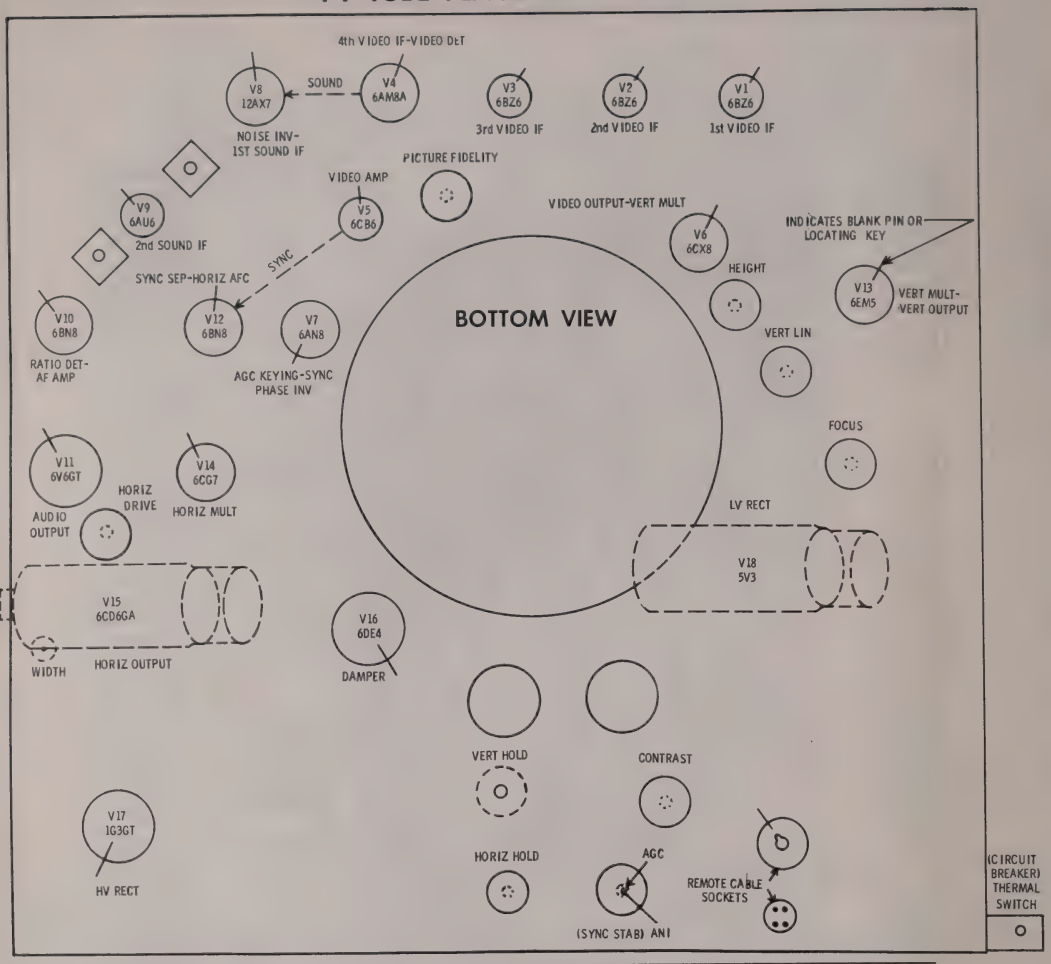


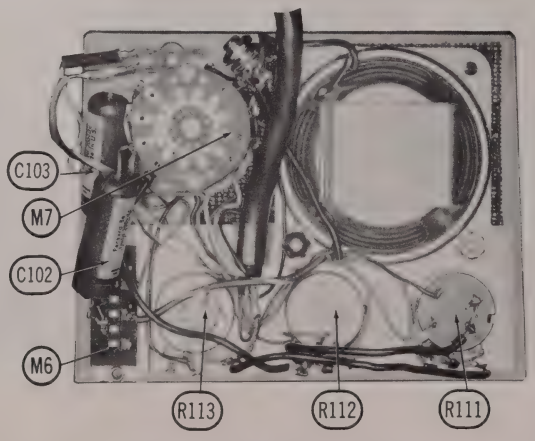
STEREO AMP CHASSIS - BOTTOM VIEW



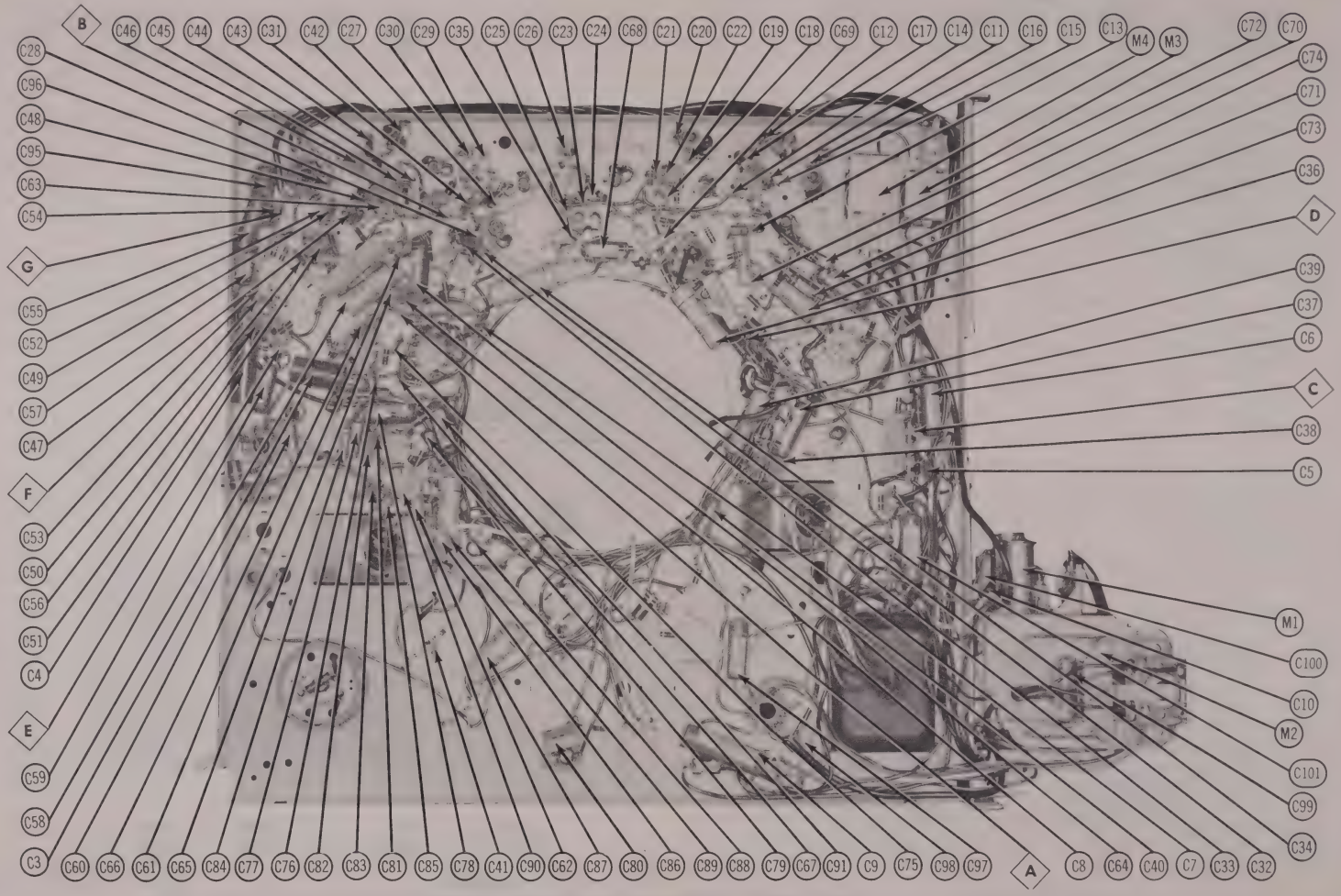
FM AM TUNER BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.

TV TUBE PLACEMENT CHART





REMOTE CONTROL RM-203



TV CHASSIS BOTTOM VIEW - CAPACITOR & MISC. IDENT.

VHF TUNER PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC			• RAYTHEON • SYLVANIA •		
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V201	RF Amp.	6ER5GG	V202	Mixer-Osc.	6CG8A

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	30							
C202	28			TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C203	1000		EF-001	MFT-1000		CCF-102	CT280A	
C204	1.8-7.0			829-7				
C205	100		EF-0001	MFT-100				
C206	.5-3.5							
C207	.6-3.5							
C208	33		NPO-DI 33	DTZ-33	C10Q33C	CCTO-330	CNO-433	10TCC-Q33
C209	.5 10%		NPO-SI .5	TCZ-R5				
C210	1000		EF-001	MFT-1000		CCF-102	CT280A	
C211	2.0 N1500 10%							
C212	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C213	8.2 NPO ±.5mmf		NPO-DI 8.2		C10V82C			10TCC-V82
C214	3.0 NPO 10%		NPO-DI 3.0	DTZ-3R3	C10V3C	CCTO-3R3	CNO-533	10TCC-V3
C215	3.6 NPO ±.25mmf							
C216	1000		EF-001	MFT-1000		CCF-102	CT280A	
C217	1000		EF-001	MFT-1000		CCF-102	CT280A	
C218	1000		EF-001	MFT-1000		CCF-102	CT280A	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R201	47K	
R202	1000Ω	
R203	2700Ω	

ITEM No.	RATING	REMARKS
R204	220K	
R205	22K	
R206	1000Ω	

ITEM No.	RATING	REMARKS
R207	12K	
R208	10K	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Packard-Bell PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M201	1N87		1N60	1N82A	1N82A	Fine Tuning

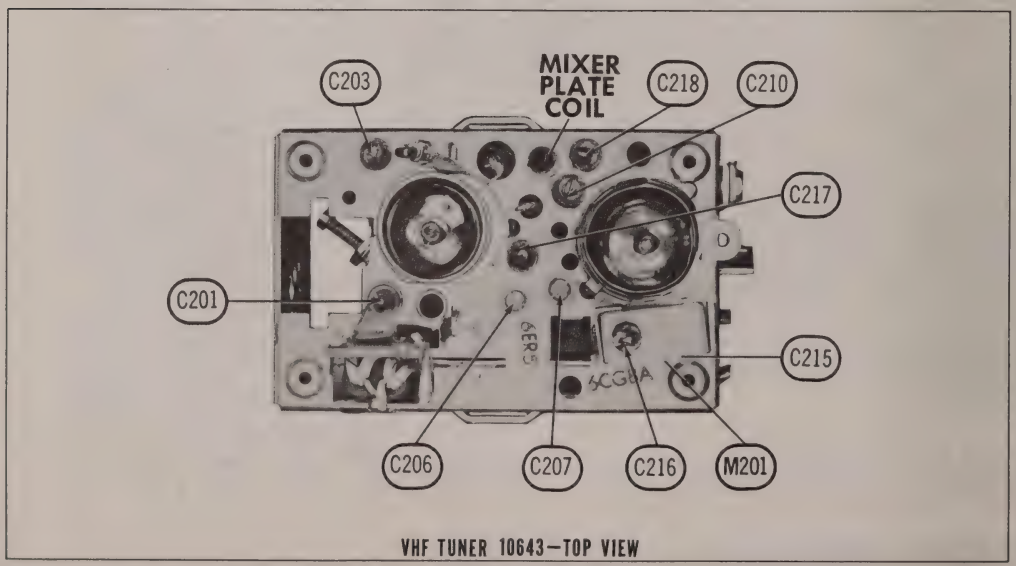
TUNER ALIGNMENT INSTRUCTIONS

OSCILLATOR ALIGNMENT

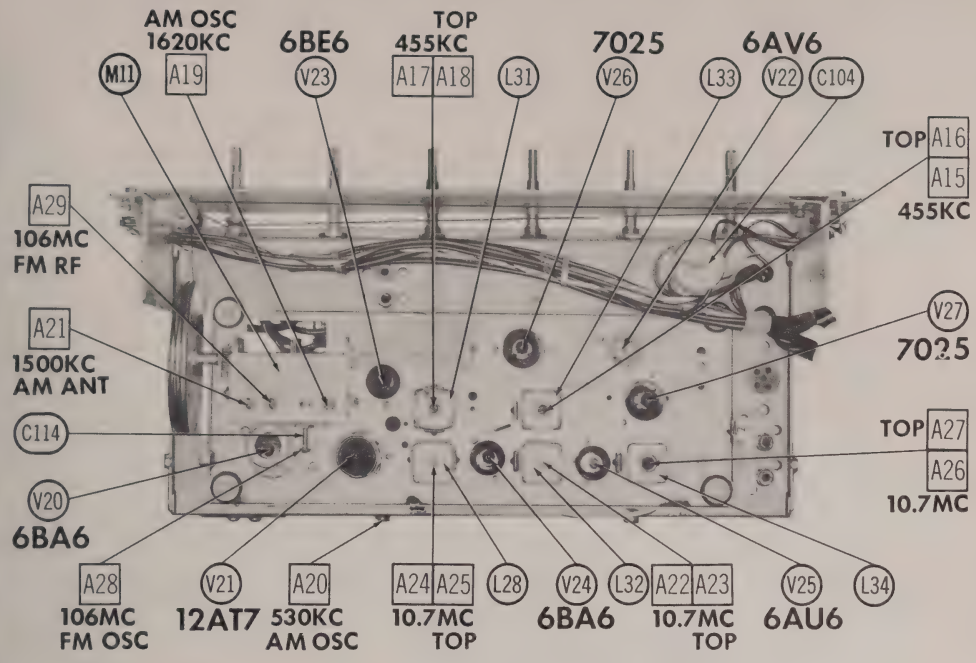
The individual channel adjustment screws are accessible one at a time thru a hole in the rear cover of the tuner as the Channel Selector is rotated. Set the Fine Tuning to the center of its range and switch to channel to be adjusted. Adjust for best picture and sound.

RF AND MIXER ALIGNMENT

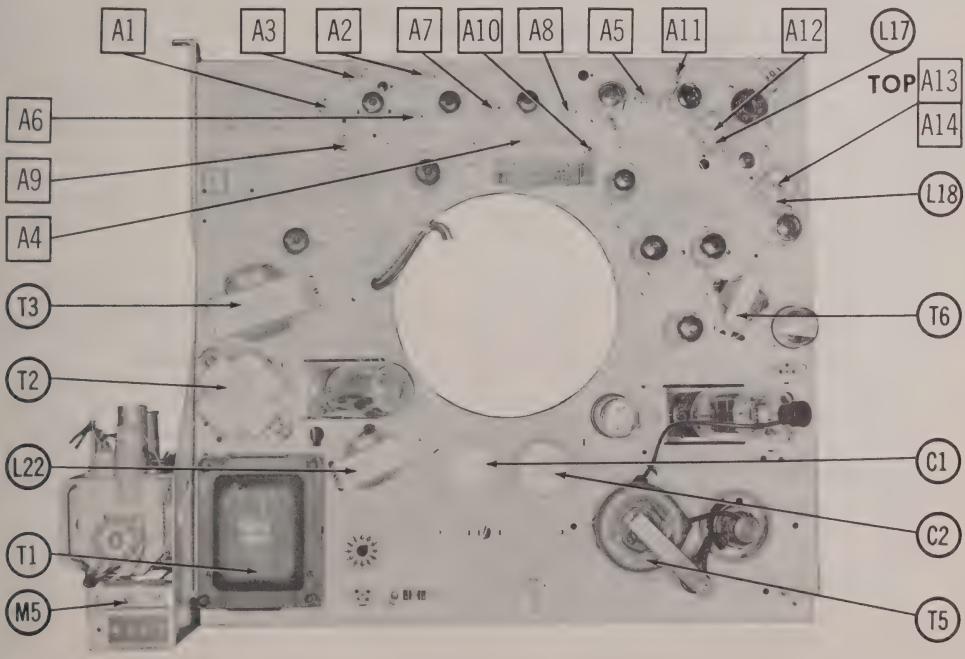
This portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be attempted in the field.



VHF TUNER 10643—TOP VIEW



FM AM TUNER - TOP VIEW



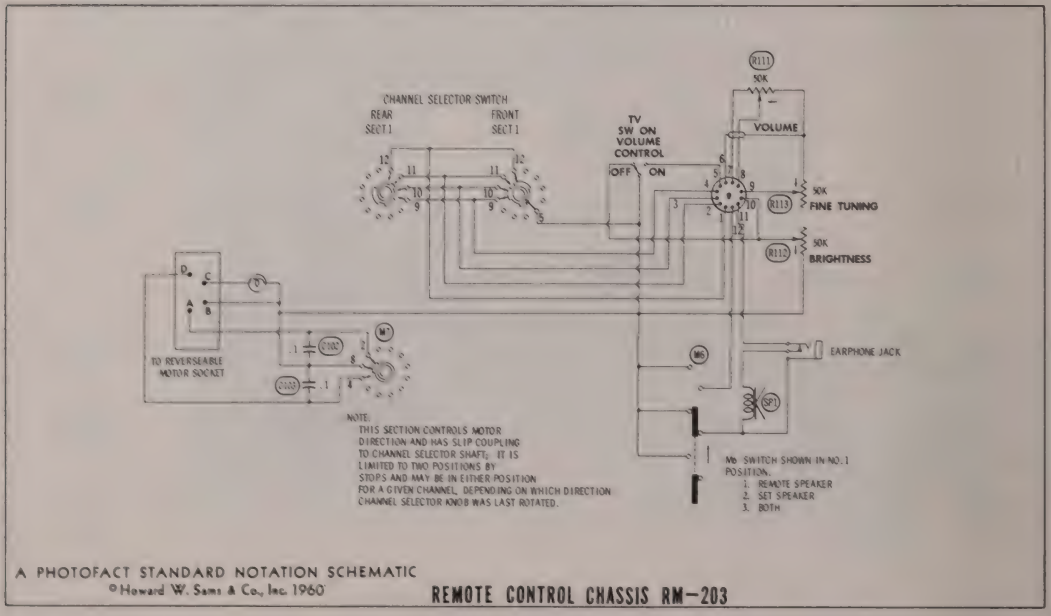
TV CHASSIS - TOP VIEW

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	• 60K	56Ω	0Ω	.2Ω	▲470Ω	▲470Ω	0Ω		
V2	6BZ6	60K	▲100Ω	0Ω	.2Ω	†470Ω	†470Ω	INF		
V3	6BZ6	• 60K	56Ω	0Ω	.2Ω	†3000Ω	†3000Ω	0Ω		
V4	6AM8A	180Ω	.3Ω	†4000Ω	0Ω	.2Ω	†4000Ω	.3Ω	2800Ω	0Ω
V5	6CB6	2800Ω	68Ω	.2Ω	0Ω	†5700Ω	†3000Ω	0Ω		
V6	6CX8	0Ω	• 1.8meg	• †2meg	.2Ω	0Ω	• 180Ω	220K	†3000Ω	†3900Ω
V7	6AN8	†13K	†1meg	3300Ω	.2Ω	0Ω	• 330K	†40Ω	†53K	†3000Ω
V8	12AX7	†100K	• 115K	2200Ω	.2Ω	.2Ω	†4000Ω	100K	68Ω	0Ω
V9	6AU6	100K	0Ω	0Ω	.2Ω	†6300Ω	†21K	120Ω		
V10	6BN8	INF	0Ω	INF	.2Ω	0Ω	24K	†440K	1meg	0Ω
V11	6V6GT	TP	.2Ω	†440Ω	†40Ω	470K	TP	0Ω	560Ω	
V12	6BN8	2meg	1meg	1meg	.2Ω	0Ω	560Ω	†90K	4.7meg	0Ω
V13	6EM5	†510Ω	NC	• 2.7meg	0Ω	.2Ω	• 2.7meg	0Ω	NC	†800Ω
V14	6CG7	†6800Ω	2.5meg	1200Ω	.2Ω	0Ω	†150K	100K	1200Ω	0Ω
V15	6CD6GA	TP	0Ω	0Ω	NC	• 710K	NC	.2Ω	†12K	TOP CAP †16Ω
V16	6DE4	NC	TP	¶1.5meg	NC	†40Ω	NC	.2Ω	0Ω	
V17	1G3GT		PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE			TOP CAP †386Ω
V18	5V3	NC	¶	NC	25Ω	NC	27Ω	NC	¶	
V19	23CP4	0Ω	220K	†1meg	• †270K	NC	NC	†180K	.2Ω	
V201	6ER5 GG	0Ω	2.9meg	0Ω	.2Ω	†4900Ω	0Ω	0Ω		
V202	6CG8A	10K	†16K	0Ω	0Ω	.2Ω	†4900Ω	†26K	0Ω	220K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
▲ MEASURED FROM PIN 7 OF V2.
† MEASURED FROM PIN 8 OF V18.
♦ MEASURED FROM PIN 3 OF V16.

NC NO CONNECTION
TP TIE POINT



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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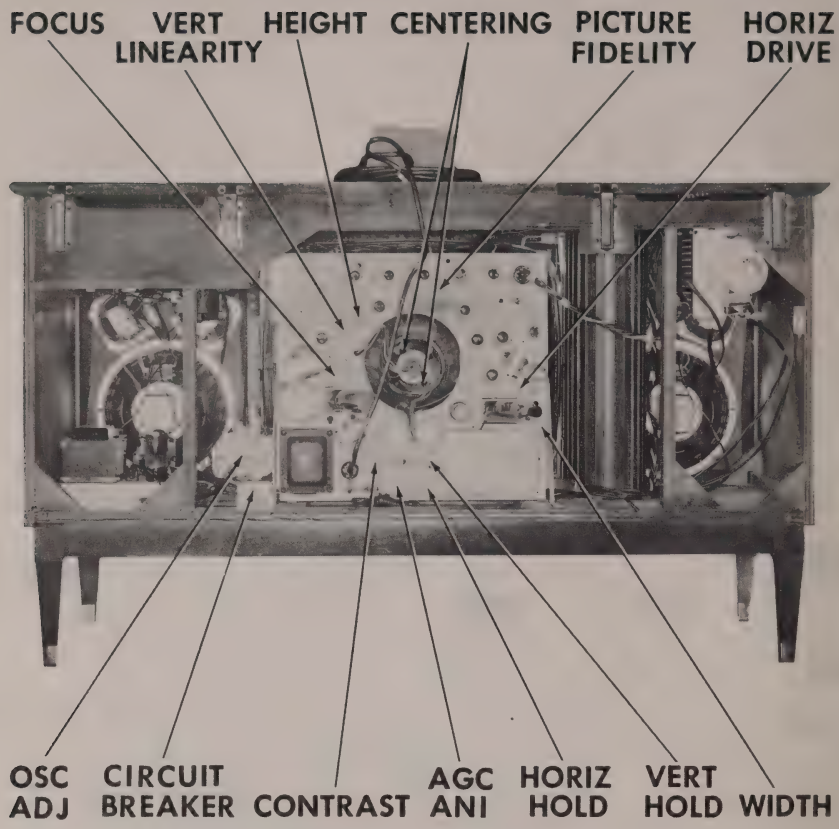
REMOTE CONTROL CHASSIS RM-203



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Set the Brightness and Contrast controls for a normal picture.

Turn the Horizontal Hold clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.

Turn the Horizontal Hold slowly counterclockwise until the picture just falls into sync.

Turn to an unused channel. If vertical lines appear near the center of the screen, slowly adjust the Horizontal Drive Control until white lines disappear.

DISASSEMBLY INSTRUCTIONS

Note: TV chassis components may be serviced while chassis is in cabinet by using the following procedure.

1. Remove rear cover.
2. Remove 1 screw holding chassis at right side of cabinet.
3. Remove 1 screw holding tuner to the cabinet. Pull tuner straight out.
4. Chassis will now swing out for access to parts.

TV CHASSIS REMOVAL MODEL 23DK1

1. Remove 8 wood screws holding rear cover. Remove rear cover.
2. Remove remote control plug.
3. Remove picture tube socket, hi voltage lead, plug from radio, and yoke.
4. Remove 2 bolts holding chassis. Loosen 2 screws holding brace at top and let brace slide down.
5. Remove chassis.

PICTURE TUBE REMOVAL

1. Follow steps 1 thru 5 of "Chassis Removal".
2. Loosen mounting straps on both sides of picture tube.
3. Remove picture by pulling straight out.

PHOTOFACT® Folder

PRODUCTION CHANGE BULLETIN 241

PRODUCTION CHANGE BULLETIN 241

SILVERTONE MODELS 1212, 1213, 1214 (CH. 528.53740)

Silvertone Models 208, 209, 210 (Ch. 528.53660) were covered in PHOTOFACT Folder 16 - Set 478.

Models 1212, 1213, 1214 (Ch. 528.53740) are added during late production. These units are electrically identical except for the following changes.

COUPLATE CHANGE

K1 (IF Coupling Couplate) is changed to Part #13-43-3. The following value changes are made in this couplate.

The 100Ω resistor between lugs 1 and 5 is changed to 560Ω.

The 1500Ω resistor between lug 5 and ground is changed to 1000Ω.

The 39K resistor between lugs 8 and 9 is changed to 33K.

COMPONENT CHANGES

R2 is increased from 12K to 33K.

R3 is omitted.

R4 is increased from 2200Ω to 2700Ω.

R5 is increased from 3900Ω to 4700Ω.

R6 is decreased from 68Ω to 56Ω.

R7 is decreased from 820Ω to 680Ω.

R8 is decreased from 68Ω to 56Ω.

R9 is decreased from 820Ω to 680Ω.

R11 is omitted.

COMPONENTS ADDED

An 18mmf capacitor is added from the Base of X2 (1st IF Amp.) to the Base of X3 (2nd IF Amp.).

A 12K resistor is added from the Base of X1 (Converter) to ground.

A 100K resistor is added from the Base of X3 (2nd IF Amp.) to the junction of C9 & L5.

TRANSISTOR CHANGES

X1 (Converter) is changed to a type R321.

X2 (1st IF Amp.) is changed to a type R354.

X3 (2nd IF Amp.) is changed to a type R355.

X4 (Output) is changed to a type R388.

X5 (Output) is changed to a type R388.

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 16 IN SET 478

PRODUCTION CHANGE BULLETIN 241

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 2 IN SET 474

Truetone Model 2DC3030A was covered in PHOTOFACT Folder 2 - Set 474.

Model 2DC3130 is added during late production. This unit is electrically identical to 2DC3030A except for the following changes.

COMPONENT CHANGES

C43 is increased from 470mmf to .001mfd.

C48 is increased from 68mmf to 95mmf.

R8 is increased from 10K to 22K.

R51 is decreased from 47K to 33K.

R60 in decreased from 4.7Ω to 4.5Ω.

R61 is increased from 26Ω 15 watt to 46Ω 20 watt.

TUBE CHANGE

V8 (Horizontal Output Tube) is changed from a type 25DN6 to a type 12DQ6B.

TUNER CHANGE

The UHF Tuner is changed to Part #25A1193-1. The VHF Tuner is changed to Part #25A1198-1. A schematic diagram showing the UHF/VHF Tuners is given on the reverse side.

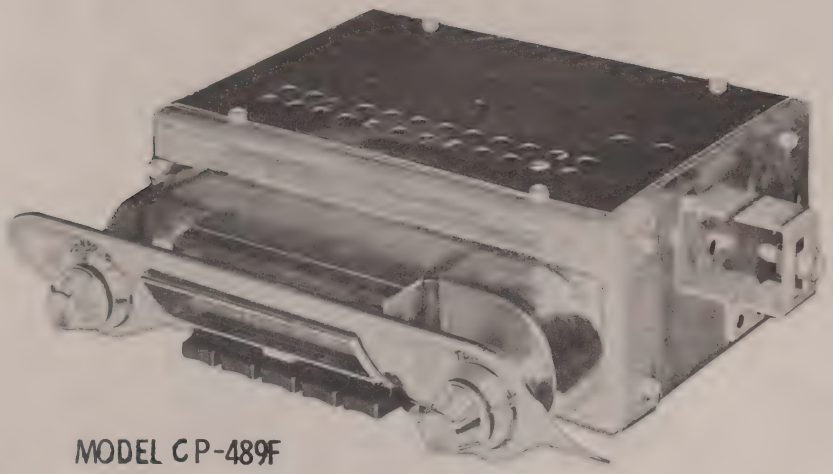
TRUETONE MODEL 2DC3130

UHF IF INPUT
(IF UHF EQUIPPED)

UHF TUNER SCHEMATIC
(IF UHF EQUIPPED)

Truetone UHF Tuner 25A1193-1, VHF Tuner 25A1198-1.

Schematic Diagram Courtesy of Western Auto Supply Co.



MODEL CP-489F

TRADE NAME	Automatic Models CAP-49, CP-489F (For 1959 Chevrolet Automobiles)
MANUFACTURER	Automatic Radio Mfg., Co., Inc., 122 Brookline Ave., Boston 15, Mass.
TYPE SET	Battery Operated 4 Tube; 2 Transistor Custom Built Automobile AM Receiver
POWER SUPPLY	12 Volt Storage Battery
TUNING RANGE	BROADCAST 538 - 1610KC RATING 1.1 Amp. @ 12.6 Volts DC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1 thru A4 .... GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A5, A6 ..... GENERAL CEMENT #5000, 5003, 8276, 8290
WALSCO #2512, 2515, 2522, 2523, 2525, 2537

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to pin 7 (grid) of Converter. Low side to chassis.	265KC (400~ Mod.)	High frequency end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	1610KC	"	"	A5	"
3.	Antenna receptacle thru dummy (Fig. 1).	"	"	"	A6, A7	Adjust for maximum output while rocking tuning gang.
4.	With radio installed in car and antenna fully extended, tune in a weak station near 1400KC and adjust A7 for maximum output.					

PUSHBUTTON ADJUSTMENT

1. Pull pushbutton out.
2. Tune manually to desired station.
3. Press pushbutton in firmly.
4. Repeat for remaining pushbuttons.

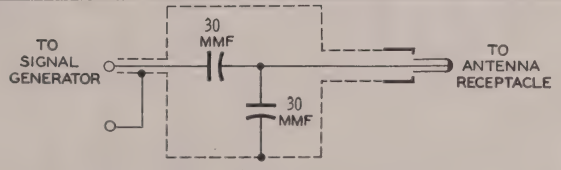


FIG. 1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	RF Amplifier	12BL6 (12AF6) *	V3	IF Amplifier	12BL6 (12AF6) *
V2	Converter	12AD6	V4	Det. - AVC - AF Amp.	12AE6A (12FT6) *

* Alternate.

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N363	Driver		2N406	2N363	2N406	PNP
X2	CT1124	Output	2N236B	2N301		2N242	PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	AUTOMATIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	▲500	15	20-317	AFH3-00-95		WP200.6		TVLS-2157 *	①
B	■500	15							
C2	750	3	20-757	SRE3V500	BR1000-6	PETA190	TD-1000-6	TVAS-1097 *	

① C1B may be 150mfd in some versions (C1 Part #20-315).
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

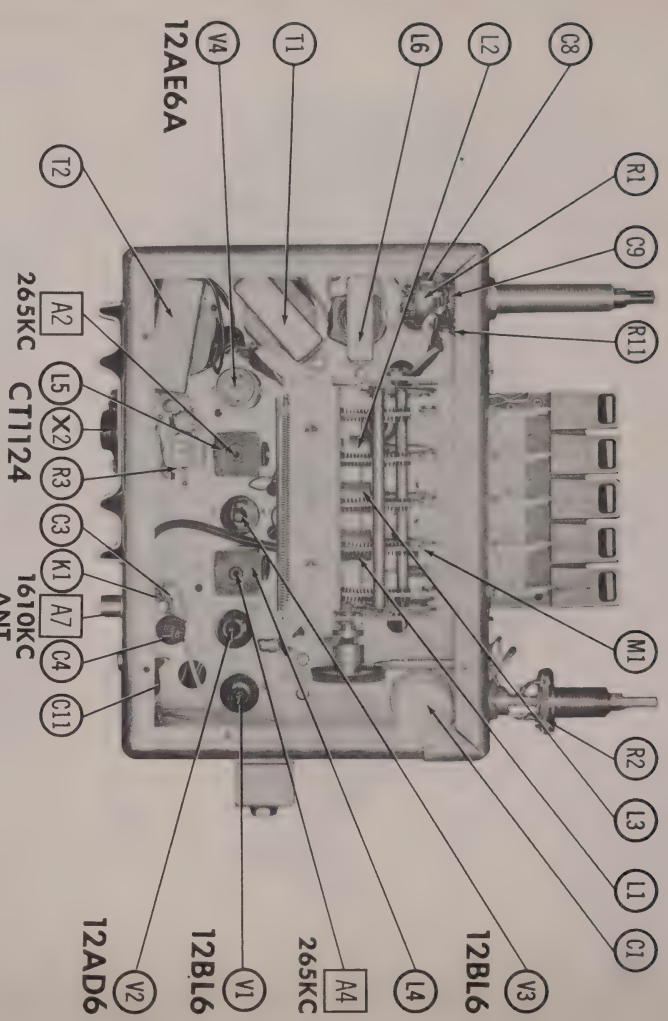
ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3		#28-800K						
C4	40 NPO		NPO-DI 39	TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C5	5 NPO		NPO-DI 5.0	DTZ-4R7	C10Q5C	CCTO-050	CNO-547	10TCC-V50
C6A								
B	40	#28-4046	NPO-DI 39	TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C								
C7	100 N750		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C8	3000		DI-3000	DD-302	BYA10D3	CCD-302	GP230	5HK-D30
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	3000		DI-3000	DD-302	BYA10D3	CCD-302	GP230	5HK-D30
C12	3000		DI-3000	DD-302	BYA10D3	CCD-302	GP230	5HK-D30
C13	27		DI-27	DD-270	L10Q27	CCD-270	GP427	10TS-Q27

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AUTOMATIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	2meg		80A1070	F1-68				Tone
B	1meg			R2-74				Volume
	200K Tap					† QJ-1265A		
C	Bushing			AK-28				
D	Switch			KR-7				Power Off-On
R2	25Ω	2(WW)	80A1086 ①					Fader
R3	500Ω	2(WW)	62-501		39-500-100	112-500-100	FL-6003	Bias
	100Ω Stop							

① Not used in some versions.
† "Concentrikit" Equivalent: K-8 Kit with Base Elements and Shafts: B13-139, P14-208 (Panel)
B13-137X, R1-223 (Rear)
76-2 (Switch)
S19 (Bushing)

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	1.2meg	
R5	47K	
R6	47K	

ITEM No.	RATING	REMARKS
R7	220Ω	
R8	22Ω	
R9	1Ω	

ITEM No.	RATING	REMARKS
R10	150Ω	(330Ω) *
R11	100K	

* Alternate Value

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	AUTOMATIC PART No.	REPLACEMENT DATA
K1	Antenna Filter	100mmf, 1.2meg	89-4204 ①	Sprague PRC-9
K2	RF & Conv. Coupling	3000mmf, 5000mmf, .047mfd, 1500Ω, 150K, 2.2meg, 4.7meg, 10meg, 10meg	89-591 ①	Sprague DT-14
K3	Audio Coupling	10000mmf, 120Ω, 6800Ω, 12K, 470K, 2.2meg	89-592 ①	Sprague F-3

① Some versions may use Individual Components in this application.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		AUTOMATIC PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Coil	†						† Part of M1
L2	RF Coil	†						
L3	Osc. Coil	†						
L4	1st IF Trans.	14-265X	16-6752	16-6752	BC-350	12-H1	RF-3	
L5	2nd IF Trans.	14-267X	16-6754	16-6754	BC-354	12-H6		

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	AUTOMATIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
L6	1.1A	.7Ω	.008 Hy.	75A601						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AUTOMATIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	13	1	75A1303 ①						① Alternate Part #75A702C

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	AUTOMATIC PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	14Ω	3-4Ω	75A966							

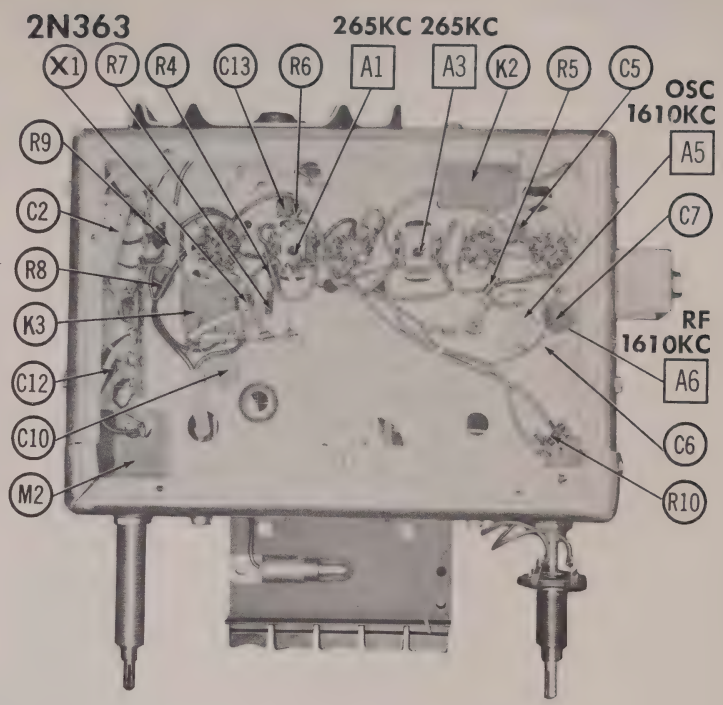
SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	AUTOMATIC PART No.	QUAM PART No.	
SP1	6" x 9"	PM	3-4Ω	73B1083	69A3	

MISCELLANEOUS

ITEM No.	PART NAME	AUTOMATIC PART No.	NOTES
M1	Tuner	78B1081 (or) 78B1082	Pushbutton Type
M2	Spark Plate		

CHASSIS—BOTTOM VIEW



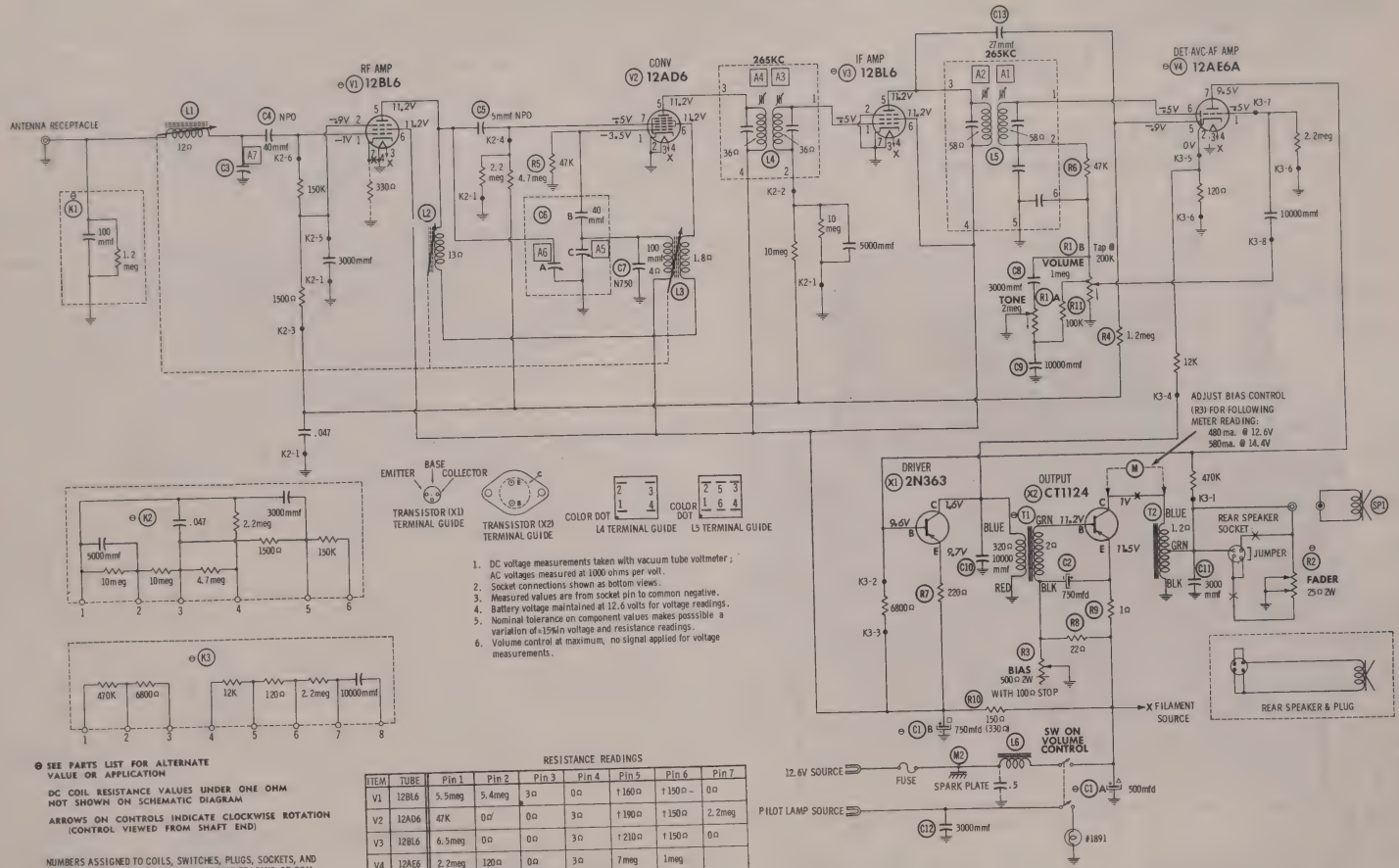
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	48A1096	Volume, Tuning
Knob	48A1063	Tone, Dummy

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire ..... Use BELDEN No. 8885
Bonding Strap ..... Use BELDEN No. 8661



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BL6	5.5meg	5.4meg	3Ω	0Ω	†160Ω	†150Ω –	0Ω
V2	12AD6	47K	0Ω	0Ω	3Ω	†190Ω	†150Ω	2.2meg
V3	12BL6	6.5meg	0Ω	0Ω	3Ω	†210Ω	†150Ω	0Ω
V4	12AE6	2.2meg	120Ω	0Ω	3Ω	7meg	1meg	

† MEASURED FROM JUNCTION OF R10 AND C1A.
TRANSISTOR CIRCUIT RESISTANCE FOR X1 AND X2 NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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AUTOMATIC MODELS CAP-49, CP-489F

PHOTOFACT® Folder

BOGEN
MODEL MO30

BOGEN
MODEL MO30

BOGEN
MODEL MO30

TRADE NAME	Bogen Model MO30
MANUFACTURER	Bogen-Presto Co., A Div. of the Siegler Corp., P. O. Box 500, Paramus, N. J.
TYPE SET	AC Operated 5 Tube 30 Watt Audio Amplifier
POWER SUPPLY	110-120 (or) 125 Volts AC, 60 Cycles RATING 110 Watts, 1 Amp. @117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of KX099

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PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	AF Amplifier	6C4	V4	Output	6L6GC
V2	AF Amplifier	ECC83/12AX7	V5	Rectifier	GZ34/5AR4
V3	Output	6L6GC			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	BOGEN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲30	500		AFH3-52	C0390	FP399.5	TMT-46	TVL-3956	
B	■20	500							
C	▲20	500							
C2A	▲20	450		AFH2-69	B0500	FP282.5	TMD-61	TVL-2935	
B	▲20	450							
C3	50	50		PRS1350	BR505	TC39	TD-50-50	TVA-1308	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	1200 10%		DI-1200	DD-122	1R5DI2	CCD-122	GP212	10TS-D12
C5	1000 10%		DI-1000	DD-102	1R5DI	CCD-102	GP210	10TS-D10
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C8	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C9	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	BOGEN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	100K	½	77-001-478	AB-41	A47-100K-Z	B13-128	U39	Volume
B	Shaft			AK-1	FKS-1/4	SK2	Not Req.	

RESISTORS

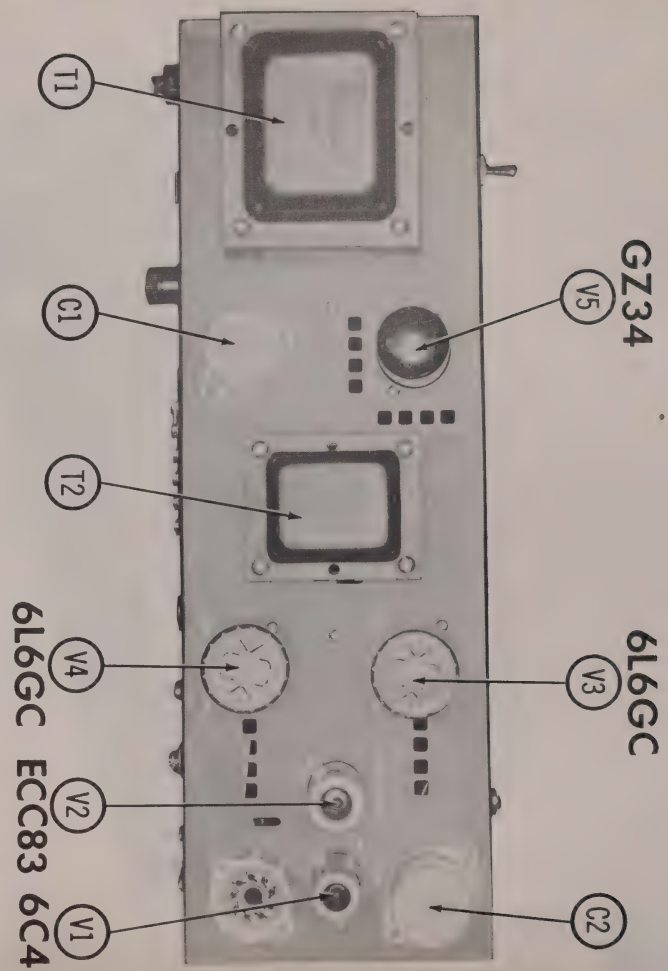
All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	100K	
R3	82K	
R4	1200Ω	
R5	15K	
R6	6.8meg	
R7	1600Ω	
R8	1meg	

ITEM No.	RATING	REMARKS
R9	82K	
R10	47K	
R11	82K	
R12	18K	
R13	2700Ω	
R14	100K	
R15	200Ω 7W	

ITEM No.	RATING	REMARKS
R16	2700Ω	
R17	100K	
R18	100K	
R19	33K 2W	
R20	1300Ω 2W	
R21	.47Ω	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	BOGEN PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	125V @ .95A Tap @ 117V @ 1A	680 VCT @ .160A	5V @ 1.9A	83-610-000				PM-8411		R-16B①
	SEC. 3									
	6.3 VCT @ 2.6A									

① Drill New Mounting Holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.1	BOGEN PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	8200Ω CT	16Ω Tap @ 8Ω, 4Ω	83-299-000							
		SEC. 2								
		230Ω								

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BOGEN PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2A 125V S/B			313002 (3AG 2A 125V) S/B	341001	MDL 2	HKP

MISCELLANEOUS

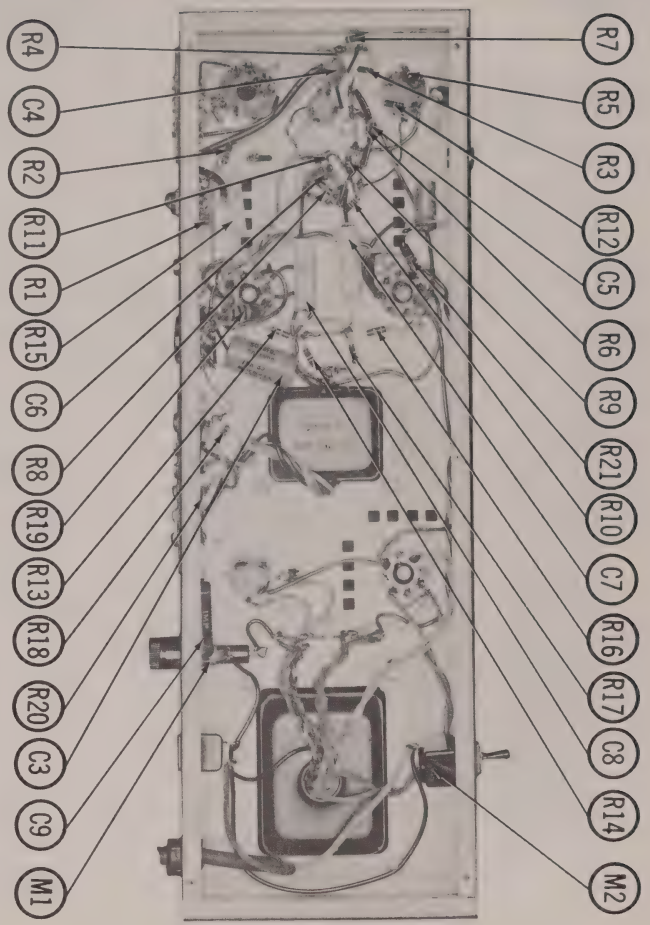
ITEM No.	PART NAME	BOGEN PART No.	NOTES
M2	Switch		Power Off-On (Toggle)

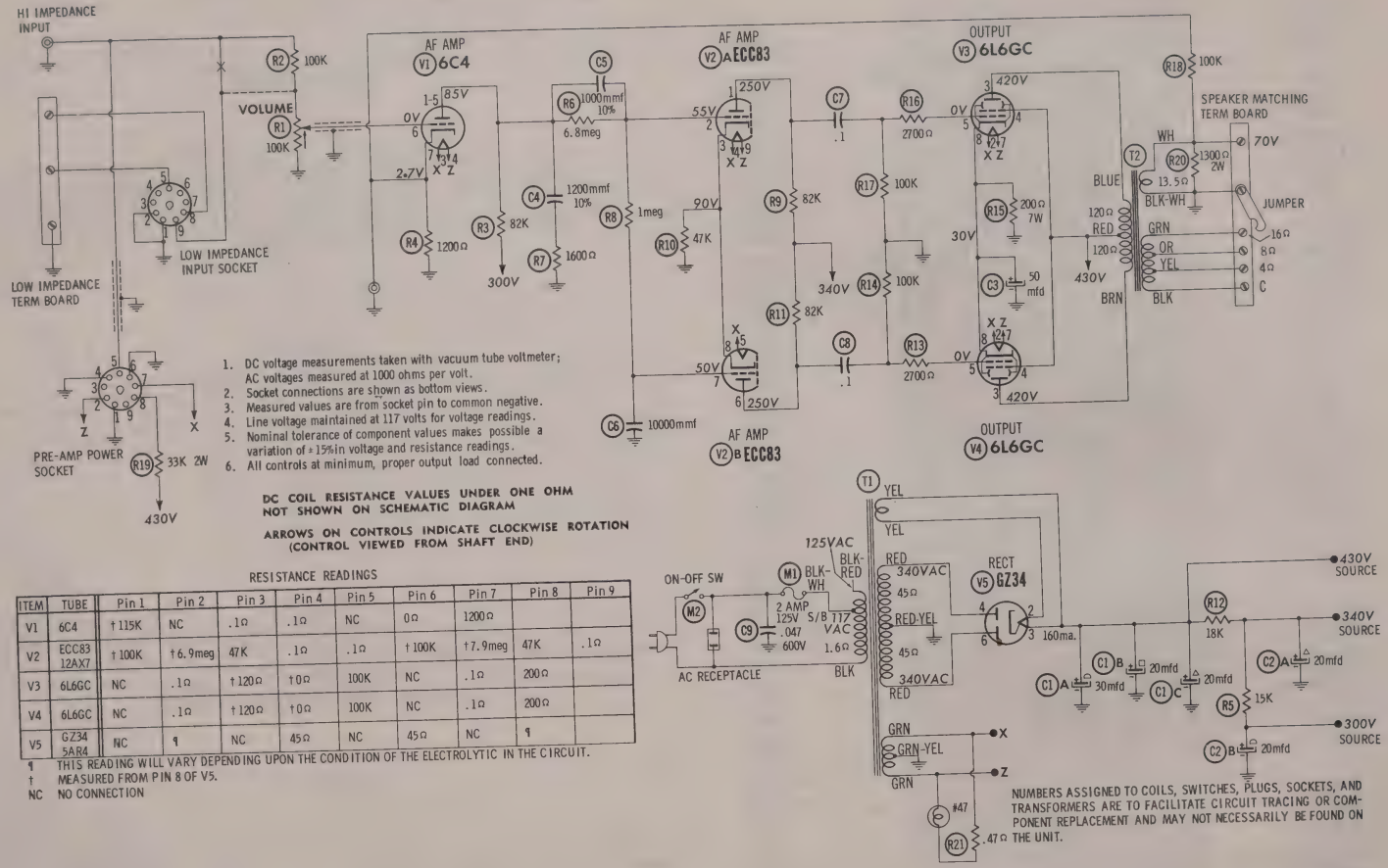
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

CHASSIS—BOTTOM VIEW





1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6C4	†115K	NC	.1Ω	.1Ω	NC	0Ω	1200Ω		
V2	ECC83 12AX7	†100K	†6.9meg	47K	.1Ω	.1Ω	†100K	†7.9meg	47K	.1Ω
V3	6L6GC	NC	.1Ω	†120Ω	†0Ω	100K	NC	.1Ω	200Ω	
V4	6L6GC	NC	.1Ω	†120Ω	†0Ω	100K	NC	.1Ω	200Ω	
V5	GZ34 5AR4	NC	¶	NC	45Ω	NC	45Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 8 OF V5.
NC NO CONNECTION

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

BOGEN MODEL MO30

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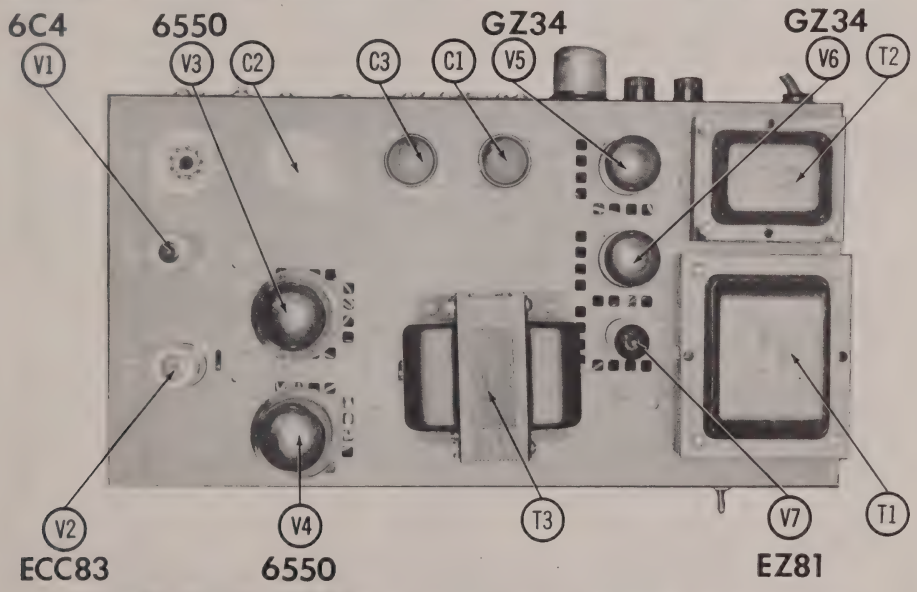
BOGEN
MODEL MO100

BOGEN
MODEL MO100

BOGEN
MODEL MO100

TRADE NAME	Bogen Model MO100
MANUFACTURER	Bogen-Presto Co., A Div. of the Siegler Corp., P. O. Box 500, Paramus, N. J.
TYPE SET	AC Operated 7 Tube 100 Watt Audio Amplifier
POWER SUPPLY	110 - 120 (or) 125 Volts AC, 60 Cycles RATING 140 Watts, 1.5 Amp. @117 Volts AC



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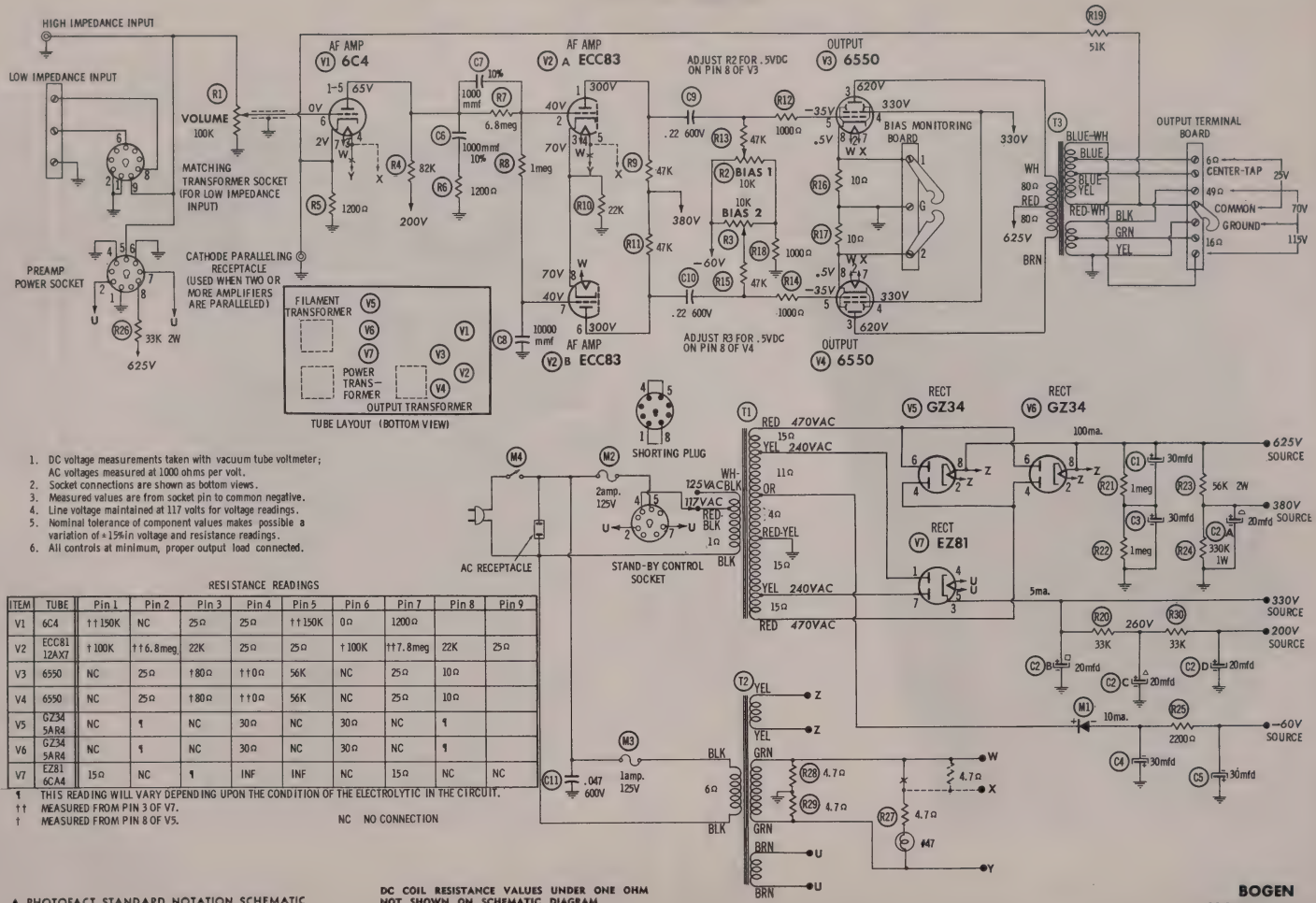
KX098

SET494 FOLDER 6



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6C4	††150K	NC	25Ω	25Ω	††150K	0Ω	1200Ω		
V2	ECC81 12AX7	†100K	††6.8meg	22K	25Ω	25Ω	†100K	††7.8meg	22K	25Ω
V3	6550	NC	25Ω	†80Ω	††0Ω	56K	NC	25Ω	10Ω	
V4	6550	NC	25Ω	†80Ω	††0Ω	56K	NC	25Ω	10Ω	
V5	GZ34 5AR4	NC	¶	NC	30Ω	NC	30Ω	NC	¶	
V6	GZ34 5AR4	NC	¶	NC	30Ω	NC	30Ω	NC	¶	
V7	EZ81 6CA4	15Ω	NC	¶	INF	INF	NC	15Ω	NC	NC

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
†† MEASURED FROM PIN 3 OF V7.
† MEASURED FROM PIN 8 OF V5.
NC NO CONNECTION

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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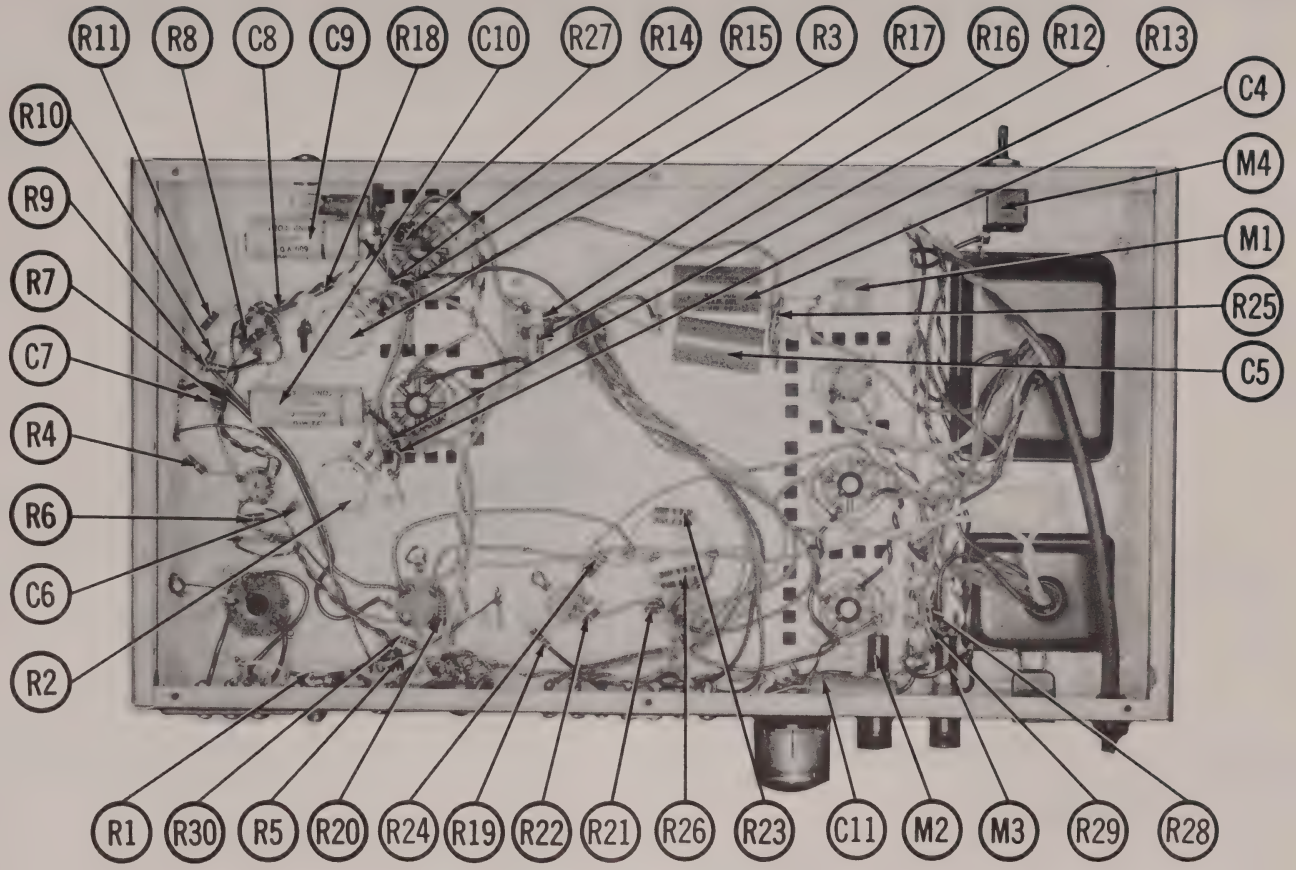
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

BOGEN MODEL MO100



CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE (CBS / GENERAL ELECTRIC / RAYTHEON / SYLVANIA)
V1	AF Amplifier	6C4
V2	AF Amplifier	ECC83/12AX7
V3	Output	6550
V4	Output	6550
V5	Rectifier	GZ34/5AR4
V6	Rectifier	GZ34/5AR4
V7	Rectifier	EZ81/6CA4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA BOGEN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No	SPRAGUE PART No.	NOTES
C1	30	400		AFH1-51	A0470	FP145	TMS-56	TVL-1720	
C2A	▲20	500			C0390	FP399.5	TMQ-123	TVL-3956	
B	■20	400			BR2050	TC83		TVA-1906	
C	▲20	350							
D	20	300							
C3	30	400		AFH1-51	A0470	FP145	TMS-56	TVL-1720	
C4	30	150		PRS1460	BR3015	TC47	TD-30-150	TVA-1412	
C5	30	150		PRS1460	BR3015	TC47	TD-30-150	TVA-1412	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	1000 10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C7	1000 10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C8	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S1
C9	.22 600V		P688N-22		CUB6P22	6DP-5-224	GEM-6022	6TM-P22
C10	.22 600V		P688N-22		CUB6P22	6DP-5-224	GEM-6022	6TM-P22
C11	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA BOGEN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100K	½	77-001-478	AB-41	A47-100K-Z	B13-128	U39	Volume
B	Shaft			AK-1	FKS-1/4	SK2	Not Req.	
R2A	10K	½	77-001-400	AB-14	A47-10K-S	B11-116	SU-20	Bias #1
B	Shaft			AK-1	FKS-1/4	SK2	Not Req.	
R3A	10K	½	77-001-400	AB-14	A47-10K-S	B11-116	SU-20	Bias #2
B	Shaft			AK-1	FKS-1/4	SK2	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	82K	
R5	1200Ω	
R6	1200Ω	
R7	6.8meg	
R8	1meg	
R9	47K	
R10	22K	
R11	47K	
R12	1000Ω	
R13	47K	
R14	1000Ω	
R15	47K	
R16	10Ω	
R17	10Ω	
R18	1000Ω	
R19	51K	
R20	33K	
R21	1meg	
R22	1meg	
R23	56K 2W	
R24	330K 1W	
R25	2200Ω	
R26	33K 2W	
R27	4.7Ω	
R28	4.7Ω	
R29	4.7Ω	
R30	33K	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	REPLACEMENT DATA BOGEN PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	125V Tap @ 117V @ .8A	940 VCT @ .100A Tap @ 480 VCT @ .005A. Tap @ 60V @ .010A	83-616-000						

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA BOGEN PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	117V @ .7A	5V @ 3.8A	6.3V @ 3.9A	83-617-000						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ .9A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.1	REPLACEMENT DATA BOGEN PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T3	4200Ω CT	115V Tap @ 6Ω CT (25VCT)	83-301-000							
		SEC. 2								
		49Ω (70V) Tap @ 16Ω								

RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA BOGEN PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.010A	*	D-5410 *	1159 *	10 *		* Selenium Type

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA BOGEN PART No. FUSE	BOGEN PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	3AG	2A 125V S/B			313002 (3AG 2A 125V) S/B	342001	MDL 2	HKP
M3	3AG	1A 125V S/B			313001 (3AG 1A 125V) S/B	342001	MDL 1	HKP

MISCELLANEOUS

ITEM No.	PART NAME	BOGEN PART No.	NOTES
M4	Switch		Power Off-On (Toggle Type)

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT® Folder with CIRCUITRACE®

GENERAL ELECTRIC MODEL CT455A

GENERAL ELECTRIC
MODEL CT455A

GENERAL ELECTRIC
MODEL CT455A

TRADE NAME	General Electric Model CT455A
MANUFACTURER	General Electric Co., Product Service, Radio Receiver Dept., 869 Broad Street, Utica, N. Y.
TYPE SET	Battery Operated Transistorized AM Receiver With Battery Operated Clock
POWER SUPPLY	4.5 Volts DC (Radio) RATING 11MA@4.5 Volts DC (No Signal, Min. Volume)
	1.5 Volts DC (Clock) 20MA@4.5 Volts DC (Signal, Normal Volume)
TUNING RANGE—BROADCAST	535 — 1620KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools: A1 thru A3, A6..... GENERAL CEMENT #8282, 8606, 8606-L, 9091
WALSCO #2526, 2541, 2542, 2543, 2544
A4, A5..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	1620KC	"	"	A4	"
3.	"	1400KC	Tune to 1400KC signal.	"	A5	Adjust for maximum output while rocking tuning gang.
4.	"	580KC	Tune to 580KC signal.	"	A6	"

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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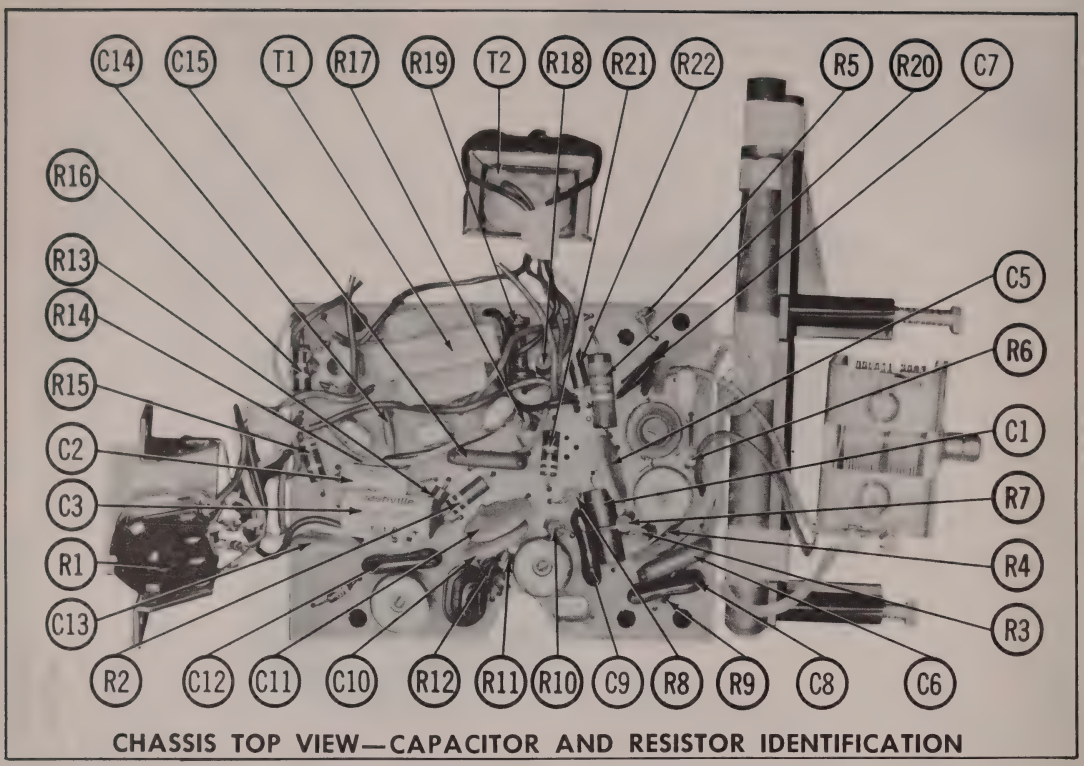
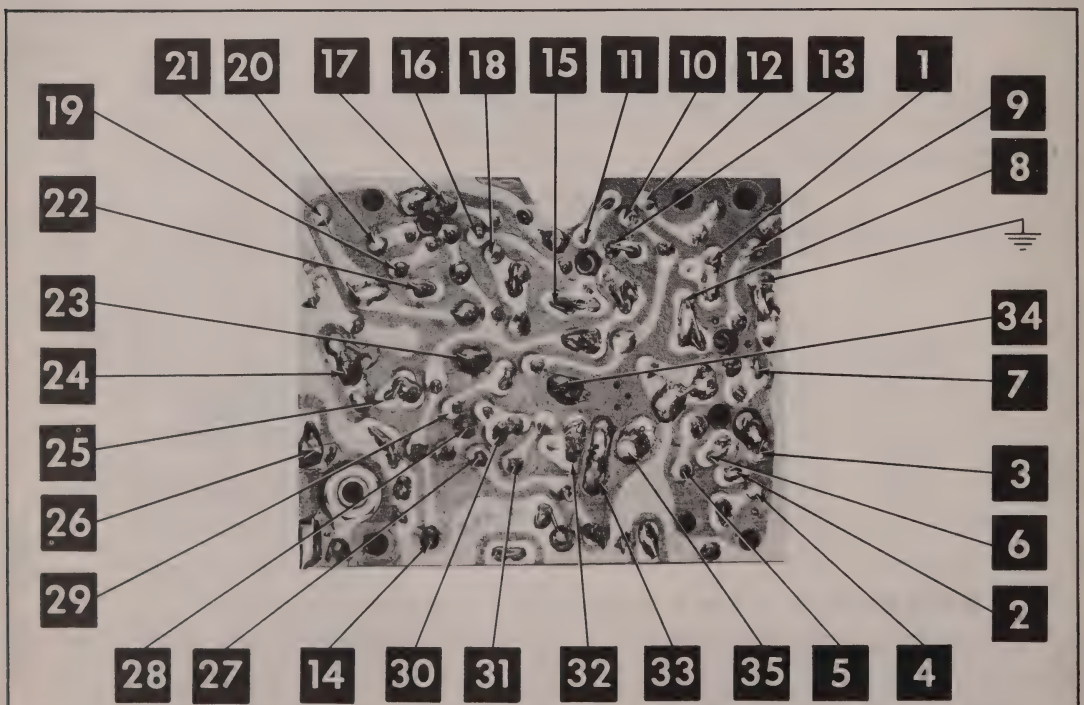
JG855

SET 494 FOLDER 7



CHASSIS TOP VIEW—CAPACITOR AND RESISTOR IDENTIFICATION



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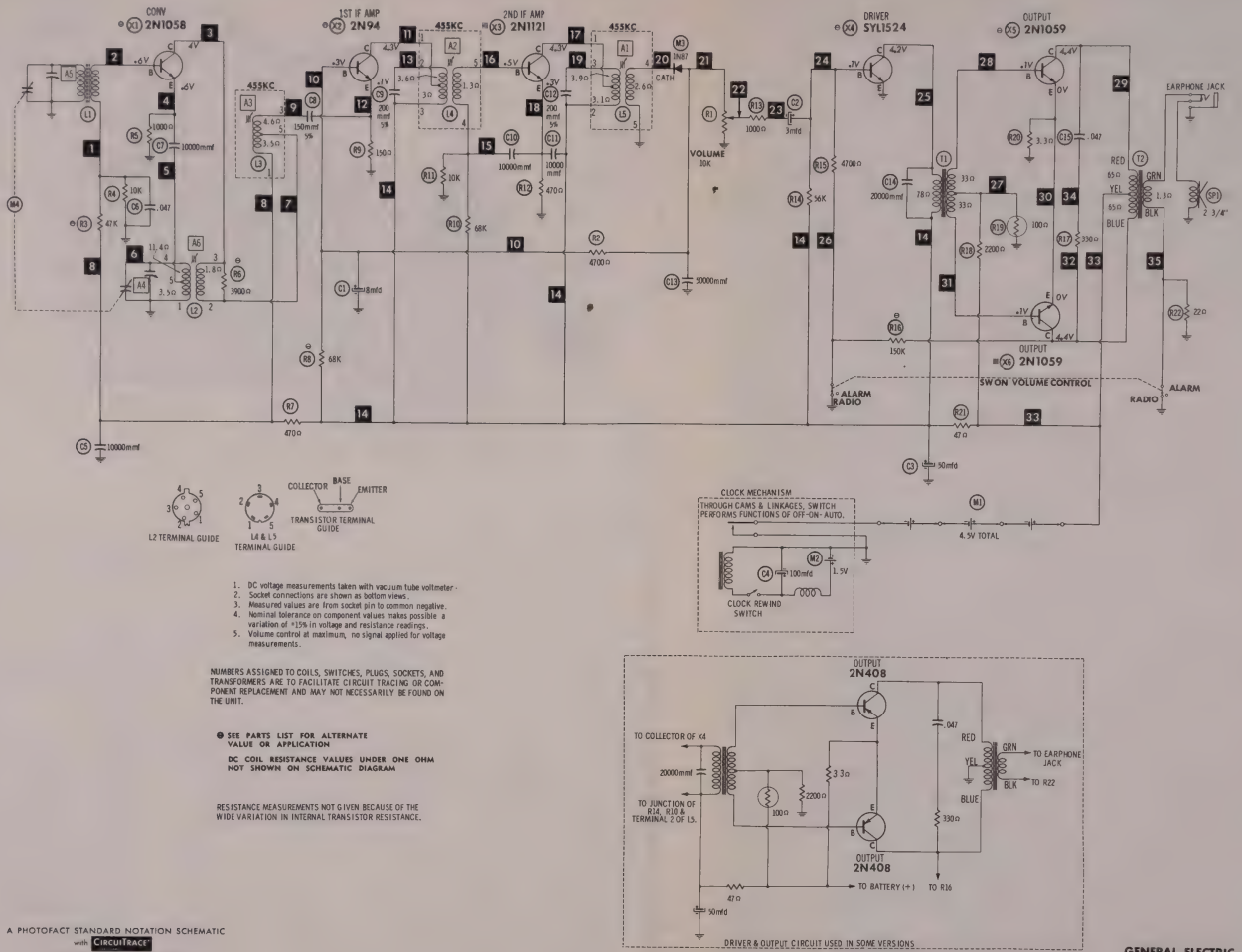
PRINTED BOARD



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE

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GENERAL ELECTRIC MODEL CT455A

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N1058①	Converter	2N317		2N1366	2N1058	NPN
X2	2N94②	1st IF Amplifier			2N1367	2N94	NPN
X3	2N1121 ③	2nd IF Amplifier			2N1367	2N1121	NPN
X4	SYL1524④	Driver	2N444	2N649		SYL1524	NPN
X5	2N1059⑤	Output	2N444	2N649		2N1059	NPN
X6	2N1059⑤	Output	2N444	2N649		2N1059	NPN

① Alternate Types 2N1058A, 2N1058B, 4JX2A815.
② Alternate Types 2N94-132, 2N94-362.
③ Alternate Types 2N165, 2N169.
④ Alternate Type 2N1059-1.
⑤ Some versions may use type 2N408 (PNP) in this application.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	G. E. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	8	6	RS-1462	PWE6008	NLW8-10	TT6X8	ML8-6	TE-1086	
C2	3	6	RS-1460	PWE6003	NLW3-25	TT6X3	ML4-6	TE-1082	
C3	50	6	RS-2404	PWE6050	NLW50-10	TT6X50	ML50-6	TE-1110	
C4	100	10		PWE10100	NLW100-15	TT15X100	ML100-15	TE-1119, 3	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	.047 50V		P288N-047	DD-503	CUB2S47	IDP-2-473	GEM-4147	2TM-S47
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	150 5%		1469-00015	TCZ-150	22R5T15	CM-19B-151J	MCE236	MS-315
C9	200 5%		1469-0002	TCZ-200	22R5T2	CM-19B-201J	MCE237	MS-320
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C12	200 5%		1469-0002	TCZ-200	22R5T2	CM-19B-201J	MCE237	MS-320
C13	50000		BPD-05	DD-503	H-05S5	IDP-2-503	TA-150	5HK-S50
C14	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C15	.047 50V		P288N-047	DD-503	CUB2S47	IDP-2-473	GEM-4147	2TM-S47

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	G. E. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A B	10K Switch	½	RS-2403					Volume Alarm-Radio

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	4700Ω	
R3	47K	Note 1
R4	10K	
R5	1000Ω	
R6	3900Ω	Note 2
R7	470Ω	
R8	68K	Note 3

ITEM No.	RATING	REMARKS
R9	150Ω	
R10	68K	
R11	10K	
R12	470Ω	
R13	1000Ω	
R14	56K	
R15	4700Ω	

ITEM No.	RATING	REMARKS
R16	150K	Note 4
R17	330Ω	
R18	2200Ω	Note 5
R19	100Ω	Note 5
R20	3, 3Ω	
R21	47Ω	
R22	22Ω	

Note 1. R3 is 56K when X1 is Type #2N1058B and 39K when X1 is Type #4JX2A815.
Note 2. Not used when X1 is Type 4JX2A815.
Note 3. R8 is 82K when X2 is Type 2N94-362.
Note 4. 220K may be used in this application.
Note 5. R18 is 100Ω temperature compensating (Part #RS-1995) and R19 is 2200Ω when X5 and X6 are PNP Type.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		G. E. PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	RS-2401	14-9013	14-9013				
L2	Osc. Coil	RS-2400						
L3	1st IF Trans.	RS-2397						
L4	2nd IF Trans.	RS-2398						
L5	3rd IF Trans.	RS-2399						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	G. E. PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1, 2	1	RS-2396						

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	G. E. PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	300Ω CT	12-16Ω	RS-2395	TR-113			TA-41	TR-113		

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	G. E. PART No.	QUAM PART No.	
SP1	2 3/4"	PM	14-16Ω	RS-1991		

BATTERIES

ITEM No.	VOLTAGE	G. E. PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	*		930 *		1015 *		M-15R *	* 3 Required (Radio)
M2	1.5V			230		A100		M-13R	Clock

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		G. E. PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M3	1N87	RS-1811	1N60	1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M4	Tuning Cap.	RS-2402	2 Gang

CABINETS & CABINET PARTS

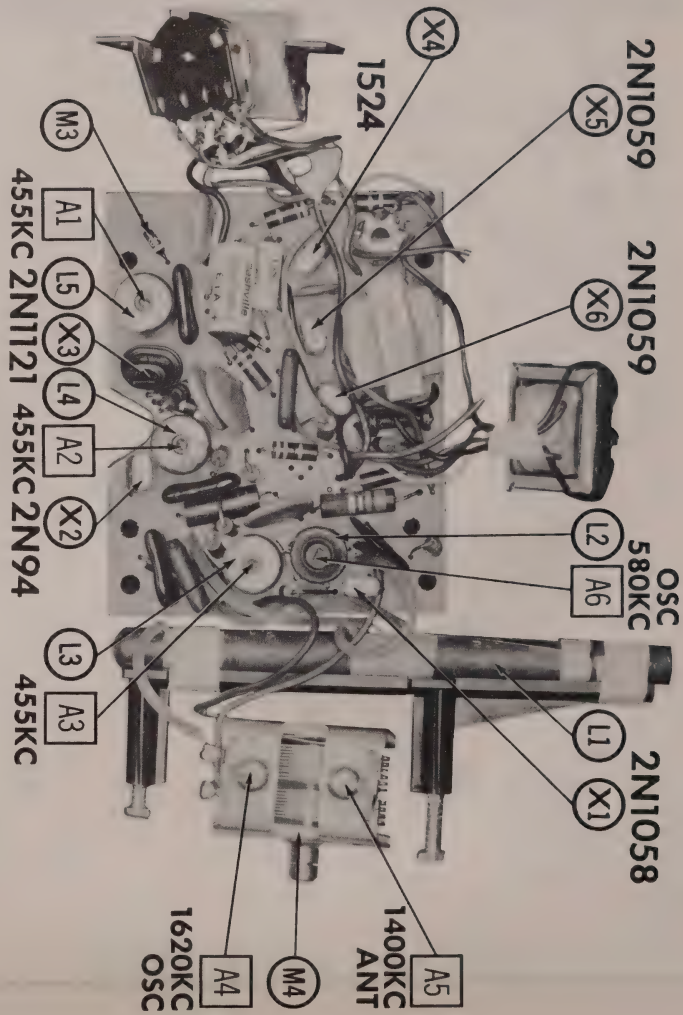
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	RS-2377	Tuning
Knob	RS-2378	Volume
Knob (Clock)	RS-2349	Time-Alarm
Knob (Clock)	RS-2376	Off-On Auto
Knob (Clock)	RS-2383	Sleep Switch
Cabinet Front	RB-1138	
Cabinet Back	RB-1139	
Crystal	RS-2347	

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT® Folder with CIRCUITRACE®

GENERAL ELECTRIC MODELS RP1115A, RP1116A, RP1130A, RP1130B

GENERAL ELECTRIC MODELS RP1115A, RP1116A, RP1130A, RP1130B

MODEL RP1130A

GENERAL ELECTRIC MODELS RP1115A, RP1116A, RP1130A, RP1130B

TRADE NAME	General Electric Models RP1115A, RP1116A, RP1130A, RP1130B
MANUFACTURER	General Electric Co., Product Service, Radio Receiver Dept., 869 Broad Street, Utica, N. Y.
TYPE SET	AC Operated 4 Tube Stereo Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	105 - 120 Volts AC, 60 Cycles RATING 38 Watts, .4 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER CH11 USED IN MODEL RP1130B OR CH15 USED IN MODEL RP1130A — SEE SIMILAR V-M 1201 — PHOTOFACT SET 436 FOLDER 18 OR RECORD CHANGER MANUAL RC-12

FOR SERVICE INFORMATION ON RECORD CHANGER CH25 USED IN MODELS RP1115A, RP1116A — SEE SIMILAR V-M 959 — PHOTOFACT SET 396 FOLDER 13 OR RECORD CHANGER MANUAL RC-11

SET 494 FOLDER 8

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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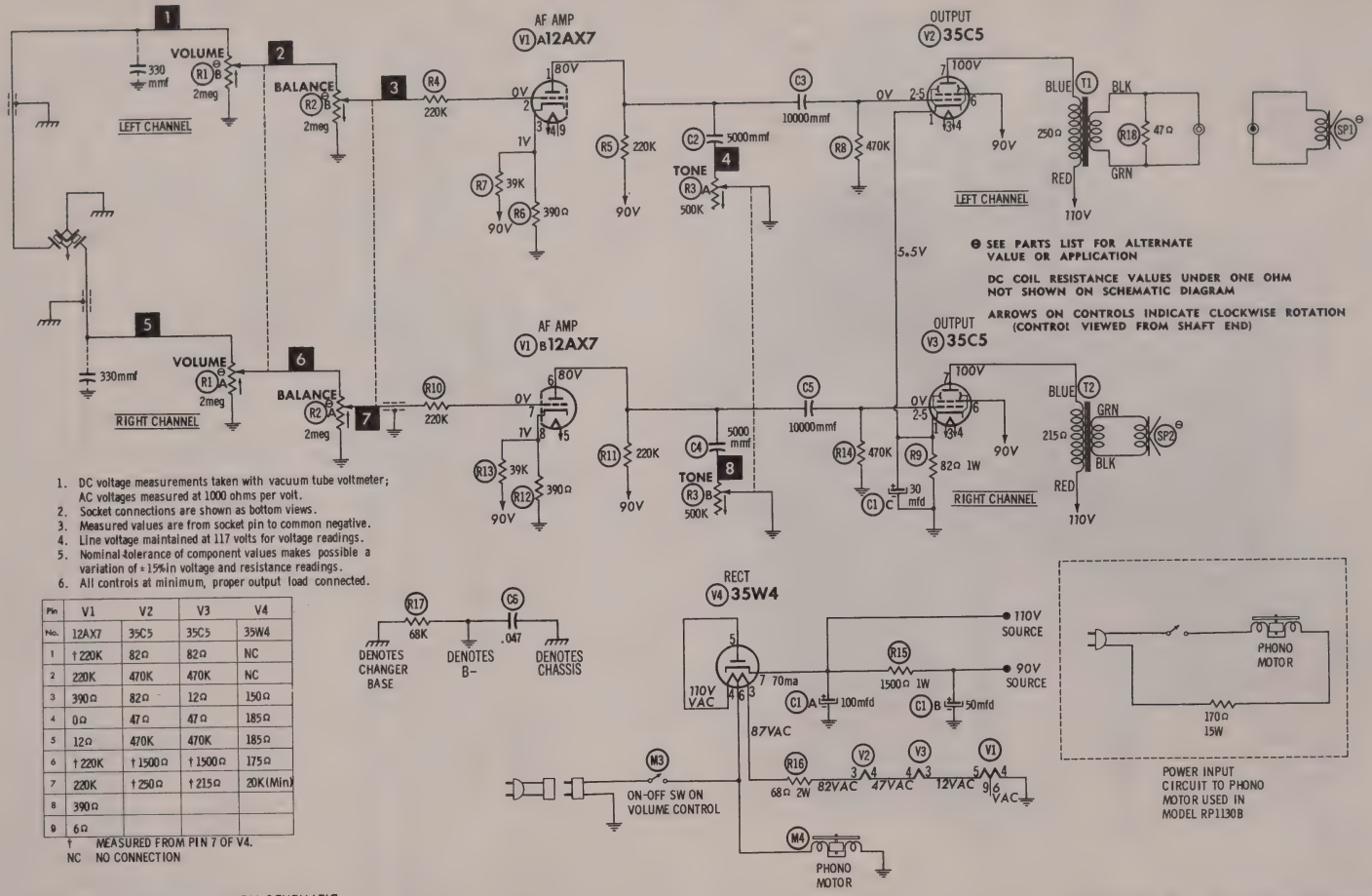

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

Pin No.	V1	V2	V3	V4
1	†220K	82Ω	82Ω	NC
2	220K	470K	470K	NC
3	390Ω	82Ω	12Ω	150Ω
4	0Ω	47Ω	47Ω	185Ω
5	12Ω	470K	470K	185Ω
6	†220K	†1500Ω	†1500Ω	175Ω
7	220K	†250Ω	†215Ω	20K (Min)
8	390Ω			
9	6Ω			

† MEASURED FROM PIN 7 OF V4.
NC NO CONNECTION

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GENERAL ELECTRIC MODELS RP1115A, RP1116A, RP1130A, RP1130B

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆		GENERAL ELECTRIC ◆		RAYTHEON ◆		SYLVANIA ◆
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Left Channel AF Amp. - Right Channel AF Amp.	12AX7	V3	Right Channel Output	35C5
V2	Left Channel Output	35C5	V4	Rectifier	35W4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	G.E. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	100	150	RS-2256	PR3-125	BR10015	WT455	TD-100-150	TVA-1420	
B	50	150			BBRD5315		TDLD-8	TVA-2450	
C	30	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C3	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C4	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	G.E. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	2meg	1/2	RS-2249①	B-75	AD47-2meg-S		FB26L	Volume, Right Channel.
B	2meg		①	SR-75	Not Req.		RU26L	Volume, Left Channel
C	Shaft			Not Req.	FS-3		CS3500	
R2A	2meg	1/2	RS-2250②				FB26R	Balance, Right Channel
B	2meg		②				RU26A	Balance, Left Channel
C	Shaft						CS3500	
R3A	500K	1/2	RS-2248	B-60	AD47-500K-Z		FB55A	Tone, Left Channel
B	500K			SR-60	Not Req.		RU55A	Tone, Right Channel
C	Shaft			Not Req.	FS-3		CS3500	

① Models RP1115A, RP1116A use 2meg Right Channel Volume (Part #RS-2344) and 2meg Left Channel Volume (Part #RS-2343).

② Not used in Models RP1115A, RP1116A.

RESISTORS

All wattages 1/2 watt, or less, unless otnerwise listed.

ITEM No.	RATING	REMARKS
R4	220K	
R5	220K	
R6	390Ω	
R7	39K	
R8	470K	

ITEM No.	RATING	REMARKS
R9	82Ω 1W	
R10	220K	
R11	220K	
R12	390Ω	
R13	39K	

ITEM No.	RATING	REMARKS
R14	470K	
R15	1500Ω 1W	
R16	68Ω 2W	
R17	68K	
R18	47Ω	

PRINTED BOARD

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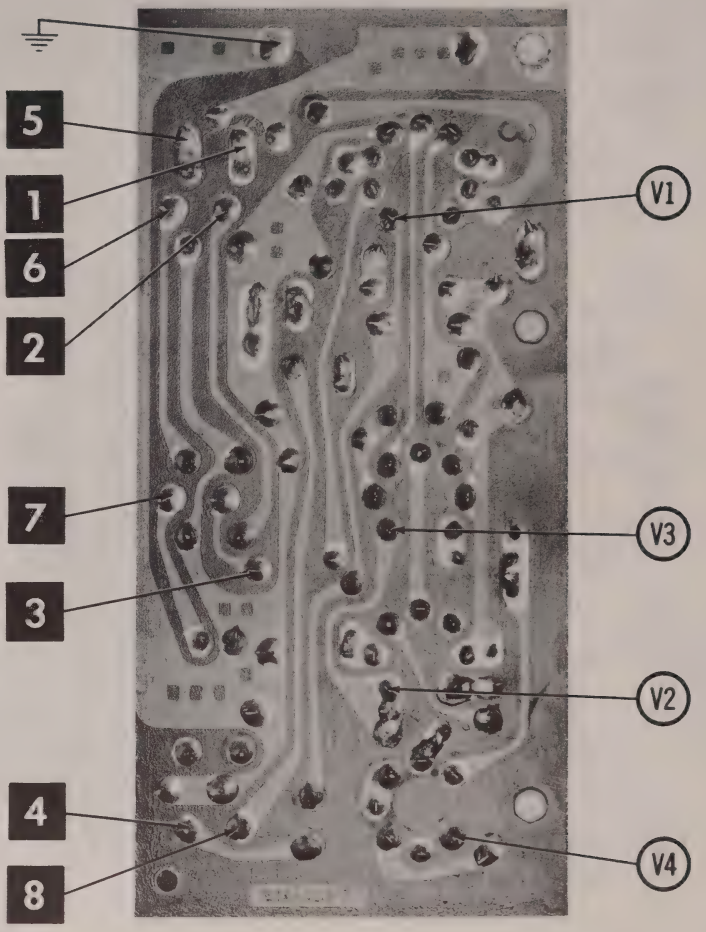
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	G. E. PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2700Ω	3-4Ω	RS-2255	24S50	A-3025①	AU-603	A-3876	24S50	S-1X	
T2	2700Ω	3-4Ω	RS-2255	24S50	A-3025①	AU-603	A-3876	24S50	S-1X	

① Drill New Mounting Hole.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	G. E. PART No.	QUAM PART No.	
SP1	5 1/4"	PM	3-4Ω	RB-1046①	52A21	① Models RP1130A, RP1130B
SP2	5 1/4"	PM	3-4Ω	RP-1046①	52A21	② Models RP1115A, RP1116A
		PM	3-4Ω	RB-1137②		
		PM	3-4Ω	RB-1137②		

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							
	G. E. PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M1	RS-1651 (Includes M2)	13T	Not Req.	13	Not Req.	A-44X	Not Req.	10TB2-S	N-8TA-S

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	G. E. PART No.	CLEVITE WALCO PART No.	JENSEN PART No.	
M2		W-204DS †♦ or W-204DD-1♦	* A-44X † or * A-44XSD †♦ or * A-44XDD♦	† Jewel ♦ Diamond * Includes Cartridge

MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M3	Switch		Off-On (Part of Changer)
M4	Motor		Drive (Part of Changer)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	RS-2246	Balance, Tone, Volume, Models RP1130A, B
Knob	RS-2341	Balance, Tone, Volume, Model RP-1115A
Knob	RS-2342	Balance, Tone, Volume, Model RP1116A

WIRING DATA

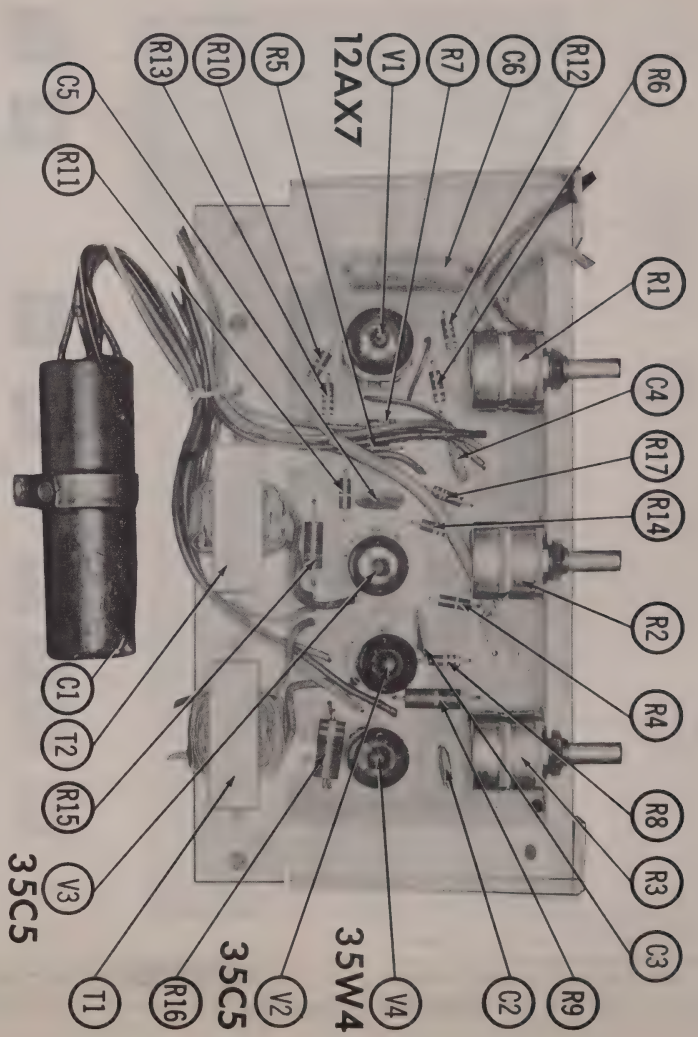
General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

Low-Loss Shielded Lead (Interconnecting) .....Use BELDEN No. 8401

Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

CHASSIS—TOP VIEW



PHOTOFACT® Folder

HARMONY
MODEL 224

HARMONY
MODEL 224

HARMONY
MODEL 224

TRADE NAME	Harmony Model 224
MANUFACTURER	CBS Electronics, 100 Endicott Street, Danvers, Mass.
TYPE SET	AC Operated 3 Tube Stereo Phono Amplifier With 4 Speed Automatic Record-Changer
POWER SUPPLY	110 - 120 Volts AC, 60 Cycles RATING 30 Watts, .3 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER — SEE SIMILAR V-M 1201 — PHOTOFACT SET 436 FOLDER 18
OR RECORD CHANGER MANUAL RC-12

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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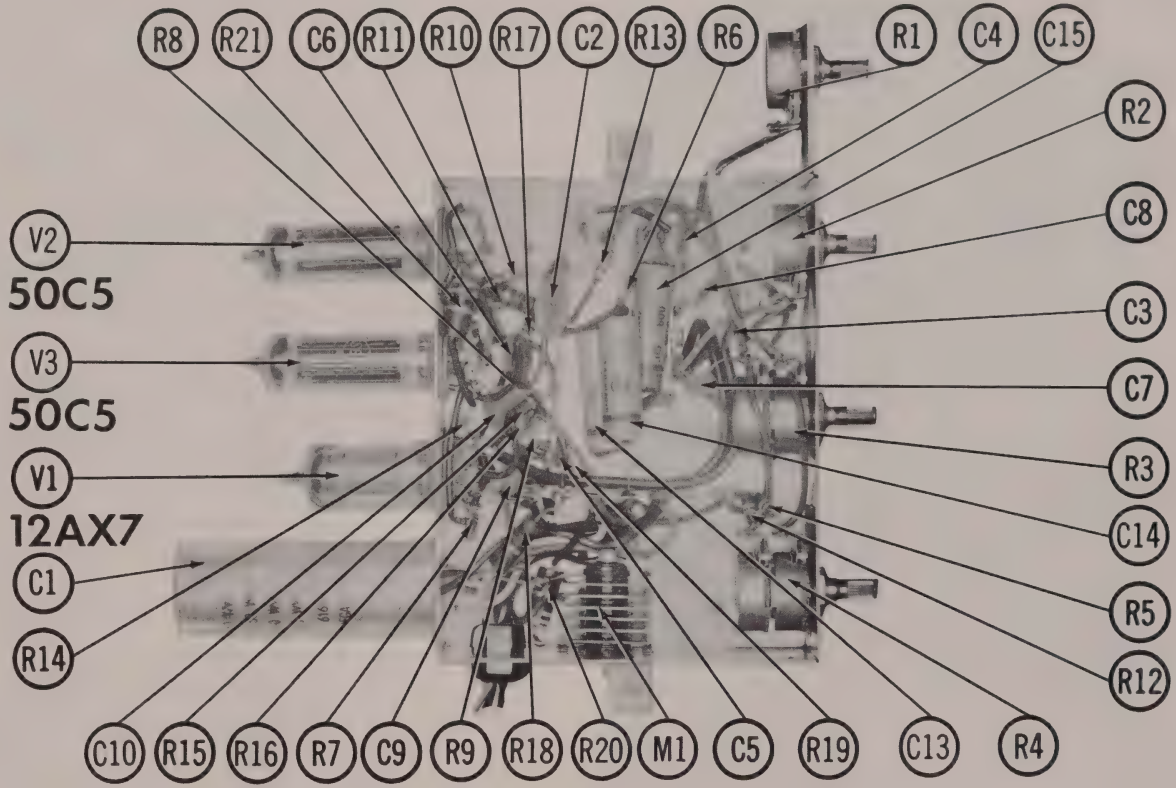
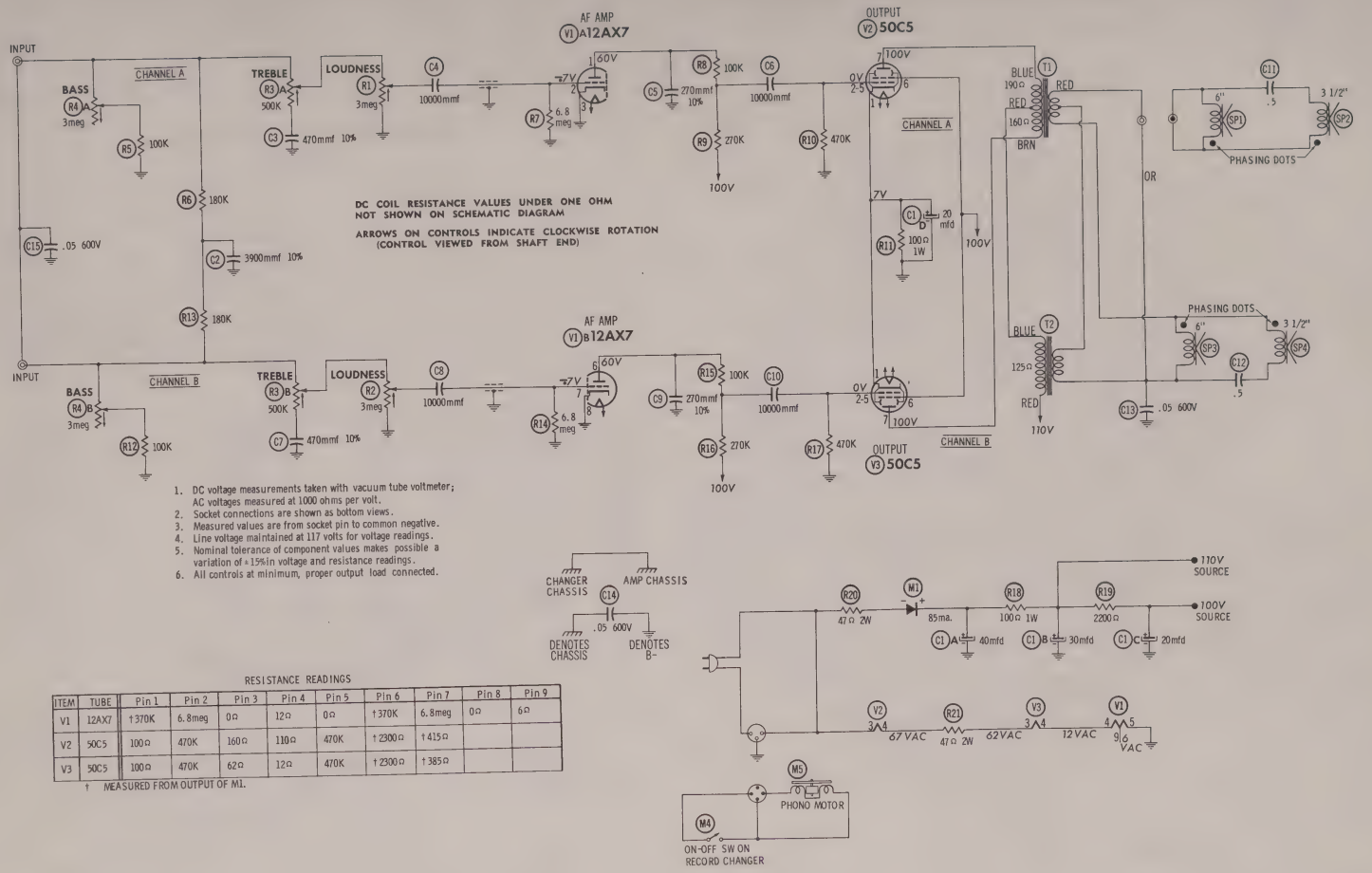


CHASSIS BOTTOM VIEW



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†370K	6.8meg	0Ω	12Ω	0Ω	†370K	6.8meg	0Ω	6Ω
V2	50C5	100Ω	470K	160Ω	110Ω	470K	†2300Ω	†415Ω		
V3	50C5	100Ω	470K	62Ω	12Ω	470K	†2300Ω	†385Ω		

† MEASURED FROM OUTPUT OF M1.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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HARMONY MODEL 224

HARMONY MODEL 224

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Channel A AF Amp. - Channel B AF Amp.	12AX7	V2	Channel A Output	50C5
			V3	Channel B Output	50C5

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	HARMONY PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	40	150	11G760	PR4-200	BBRQ44315C	WQ230	CDB-Q-1001	TVA-3448	
B	30	150						TVA-1410	
C	20	150							
D	20	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	3900 10%		DI-3900		PM6D4	CCD-392	JL-239	10TS-D39
C3	470		DI-470	DD-471	5R5T47	CCD-471	GP347	10TS-T47
C4	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C5	270 10%		DI-270	DD-271	L10T27	CCD-271	GP327	10TS-T27
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	470 10%		DI-470	DD-471	5R5T47	CCD-471	GP347	10TS-T47
C8	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C9	270 10%		DI-270	DD-271	L10T27	CCD-271	GP327	10TS-T27
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	.5 50V		P288N-5		CUB2P5	2DP-5-504	GEM-205	2TM-P5
C12	.5 50V		P288N-5		CUB2P5	2DP-5-504	GEM-205	2TM-P5
C13	.05 600V		P688N-05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5
C14	.05 600V		P688N-05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5
C15	.05 600V		P688N-05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	HARMONY PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	3meg	½	9G642	B-85	A47-3meg-S	Q13-140	U57	Loudness, Channel A
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R2A	3meg	½	9G642	B-85	A47-3meg-S	Q13-140	U57	Loudness, Channel B
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R3A	500K	½	9G644	B-59	AD47-500K-S		FA55L	Treble, Channel A
B	500K	½		SR-59	Not Req.		RU55L	Treble, Channel B
C	Shaft			Not Req.	KSS-3		CS3500	
R4A	3meg	½	9G645	B-84			FA36L	Bass, Channel A
B	3meg	½		SR-84			RU36L	Bass, Channel B
C	Shaft			Not Req.			CS3500	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R5	100K	
R6	180K	
R7	6.8meg	
R8	100K	
R9	270K	
R10	470K	

ITEM No.	RATING	REMARKS
R11	100Ω 1W	
R12	100K	
R13	180K	
R14	6.8meg	
R15	100K	
R16	270K	

ITEM No.	RATING	REMARKS
R17	470K	
R18	100Ω 1W	
R19	2200Ω	
R20	47Ω 2W	
R21	47Ω 2W	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	HARMONY PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2900Ω CT	3-4Ω	3G253							
T2	2400Ω	3-4Ω	3G254	24S63①		AU-607①	A-3825①	24S63 ①		

① Drill New Mounting Holes.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	HARMONY PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	1G157	6A21	
SP2	3½"	PM	3-4Ω	1G158	3A15TZ4.7	
SP3	6"	PM	3-4Ω	1G157	6A21	
SP4	3½"	PM	3-4Ω	1G158	3A15TZ4.7	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	HARMONY PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.085A	10G616 *	T100 *	1235AH *	100A *	SR200◆	* Silicon Type ◆ Selenium Type

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA								
	HARMONY PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M2	①	13TB		26S	S1-1 S3-3	53	J-43 & J-47X	8TA4-S	N-8TA-S

① Alternate Part #CDSC-2S.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS	
	HARMONY PART No.	CLEVITE WALCO PART No.	JENSEN PART No.		
M3		W-107STSS † or W-107STDS †◆	S-69X † or S-69XSD †◆ or S-69XDD ◆	† Jewel	◆ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	HARMONY PART No.	NOTES
M4	Switch		Off-On (Part of Changer)
M5	Motor		Phono Drive (Part of Changer)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	8G521	Black; Treble, Bass, Loudness
Cabinet	17G876	Grey
Cabinet	17G877	Blue
Handle	18G705	Grey
Handle	18G707	Blue

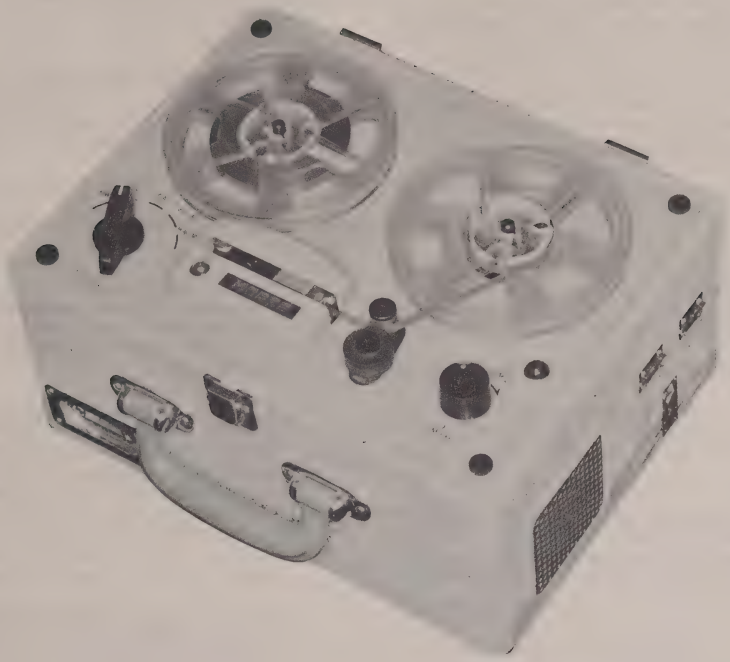
WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT® Folder

MORSE
MODEL NL-202

MORSE
MODEL NL-202



MORSE
MODEL NL-202

GENERAL INFORMATION

The Morse Model NL-202 tape recorder is a two-speed tape recorder designed to play and record two tracks of material on standard width recording tape.

Recordings can be made from a phonograph, radio, or television receiver as well as those made directly from the microphone.

The two speeds are 7 1/2 and 3 3/4 ips. Using both tracks, the recording times are as follows:

Reel Size	3 3/4" Speed	7 1/2" Speed
5" (600 ft.)	1 hour	1/2 hour

Model NL-202 is designed to operate on 60 cycles, 110-120 volts, AC supply only.

Supplied by:

Morse Sewing Machine & Supply Corp.
122 West 26th Street
New York 1, New York

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1960 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

CQ430

FUNCTION OF CONTROLS

On-Off-Volume

Turn this knob clockwise to turn the power on to the unit. Further rotation increases the volume.

Selector

This control selects the different modes of operation. Turning this control in a counterclockwise direction from the Stop position, places the unit in the Rewind mode. Turning the control clockwise from the Stop position, places the unit in Play, the second position is for Record, and the third position for Monitor.

Speed Change

With brass bushing (53) on capstan (54), the speed of the tape is 7 1/2 ips. To change speed to 3 3/4 ips, remove thumb screw (52) from the capstan and take the brass bushing off.

OPERATING INSTRUCTIONS

Threading the Tape

1. Place a reel of tape on Rewinding Reel Stand (59).
2. Place an empty reel on Winding Reel Stand (8).
3. Unwind about 10" of tape from the reel. Hold a section taut and insert it in the tape slot. Make sure the dull coated side faces the rear of the recorder.
4. Insert the free end of the tape into one of the radial slots in the hub of the Winding reel. Turn the reel several turns counterclockwise to fasten the tape to the reel and to take up all slack between reels.

To Record From Microphone

1. Rotate the On-Off-Volume control to the right to turn the recorder on. Allow sufficient time for the tubes to warm up.
2. Insert the microphone plug into the "Mike" jack.
3. Set the speed for the desired speed.
4. Turn the Selector knob to the Record position.
5. Hold the microphone about 6 to 12 inches from your mouth and speak in a normal voice.
6. Adjust the volume control until the record level indicator flashes on the loudest passages.

NOTE: Correct volume level on recording is very important. Too weak a signal will result in weak playback and high background noise. Too strong a signal will result in distortion during playback.

Recording Radio Programs

Radio programs may be recorded by one of the following methods:

1. Using radio tuner — Connect the output of the tuner to the "Mike" jack and turn the selector knob to Monitor. If the program is not to be heard while recording, turn the selector knob to the Record position.
2. Microphone pickup from speaker of radio — Place the microphone about 6 to 12 inches in front of the radio speaker. Turn the radio volume control to a normal level. Turn the radio tone control to treble or high. Set the recording level and record as under "To Record From Microphone".
3. Direct connection to radio speaker — Make a shielded cable with a two conductor phone plug on one end and two alligator clips on the other end. Connect the alligator clips across the voice coil terminals of the radio speaker and insert the plug into the "Mike" jack. Set the radio volume and tone controls as described in Step 2. Set the recording level and proceed as described under "To Record From Microphone".
4. Direct connection to volume control of radio — Make a shielded cable with a two conductor phone plug on one end. Connect the other end across the radio volume control. Insert the phone plug into the "Mike" jack. Set the recording level and proceed as described under "To Record From Microphone". The setting of the radio volume and tone controls will have no effect on this setup.

To Record From Phonograph

A phono-type plug is required on the pick-up leads. Insert it into the "Mike" jack and proceed as described under "To Record From Microphone".

To Record From a Television Receiver

Use method 2, 3, or 4 as described under "Recording Radio Programs".

Dual Track Recording

These recorders are designed to record and play on one-half the width of the tape at a time; thereby, resulting in two-track recording. After the first recording is completed, remove the full reel from the winding reel stand (8), turn the reel over and place it on the rewinding reel stand (59). Then make another recording. The tape can be played back in the same manner.

Rewind

To rewind the tape at a rapid speed, turn the selector knob to the Rewind position.

To Play a Recording

1. Thread the tape as described under "Threading the Tape".
2. Turn Selector knob to Play position.
3. Adjust the Volume control to the desired listening level.

Using Recorder as an Amplifier for a Radio Tuner

1. To use the recorder as an amplifier, connect the output of a tuner into the Tuner jack.
2. Set the Selector knob to Monitor.
3. Turn the volume up to a desired listening level.
4. Tune in the desired station.

To Erase a Recording

In record position, any recording on the tape is automatically erased before a new recording is made. Should it be desired to erase a recording without recording new material, follow the normal recording procedure but set the volume control to the full counterclockwise position.

To Edit and Splice Tape

NOTE: It is impossible to edit and splice one track without affecting the other. Recordings to be edited should be limited to one track.

1. Tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements can be inserted between selections, etc. Unused tape can be spliced for reuse.
2. For best results, cut tape at a slight diagonal, butt ends together and fasten on the glossy side with splicing tape. Trim off any excessive width.

DISASSEMBLY

To Remove Mechanism From the Case

1. Remove the Selector and On-Off-Volume control knobs.
2. Remove the screw from the pressure roller and remove pressure roller.
3. Remove the four decoration screws from the top plate and remove the top plate.
4. Remove the four screws holding mechanism to the case.
5. Remove the Mike, Tuner, and Loudspeaker jacks.
6. Lift mechanism up and disconnect the speaker.
7. Lift the mechanism out of the case.
8. Reverse the foregoing procedure to reassemble.

To Remove Amplifier From Tape Transport

1. Remove the hex nut from the volume control.
2. Loosen set screw in plate cam (61).
3. Disconnect the head leads.
4. Disconnect the motor leads.
5. Disconnect the Record Level Indicator leads.
6. Remove the screws holding the amplifier to the Tape Transport and lift amplifier away from it.
7. Reverse the above procedure to reassemble.

ADJUSTMENTS

Rewind Reel Stand and Winding Reel Stand

Adjust screw (15) so the reel stand will rotate freely. If the screw is too tight, the reel stand will bind on the reel shaft.

TROUBLE CHART

Symptom	Cause	Remedy
No Rewind.	1. Rewind belt (39) disconnected or broken. 2. Drive belt (43) broken.	1. Replace rewind belt (39). 2. Replace drive belt (43).
No Record.	1. Spring (33) broken. 2. Drive belt (43) broken.	1. Replace spring (33). 2. Replace drive belt (43).

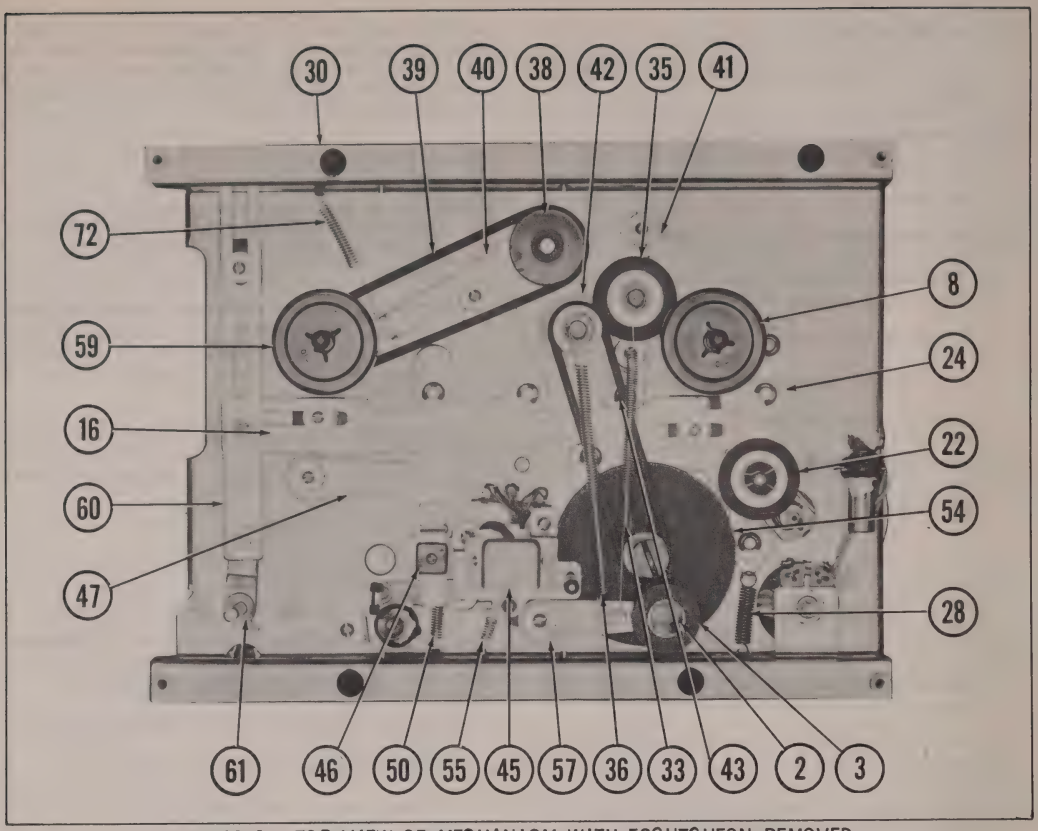


FIG.1 TOP VIEW OF MECHANISM WITH ESCUTCHEON REMOVED

TROUBLE CHART (CON'T.)

Symptom	Cause	Remedy
	3. Defective Record-Playback head (45).	3. Replace Record-Playback head (45).
No Erase.	1. Spring (50) broken or disconnected. 2. Defective erase head (46).	1. Replace or connect spring (50). 2. Replace erase head (46).
No drive in Play or Record position.	1. Spring (28) broken or disconnected. 2. Drive belt (43) broken. 3. Motor (70) defective. 4. On-Off switch defective. 5. Spring (36) broken or disconnected.	1. Replace spring (28). 2. Replace drive belt (43). 3. Replace Motor (70). 4. Replace On-Off switch. 5. Replace spring (36).

MECHANICAL PARTS LIST

Ref. No.	Description	Ref. No.	Description
1	Escutcheon Thumb Screw (4)	3	Pressure Roller
2.	Pressure Roller Thumb Screw	4	Volume Control Knob

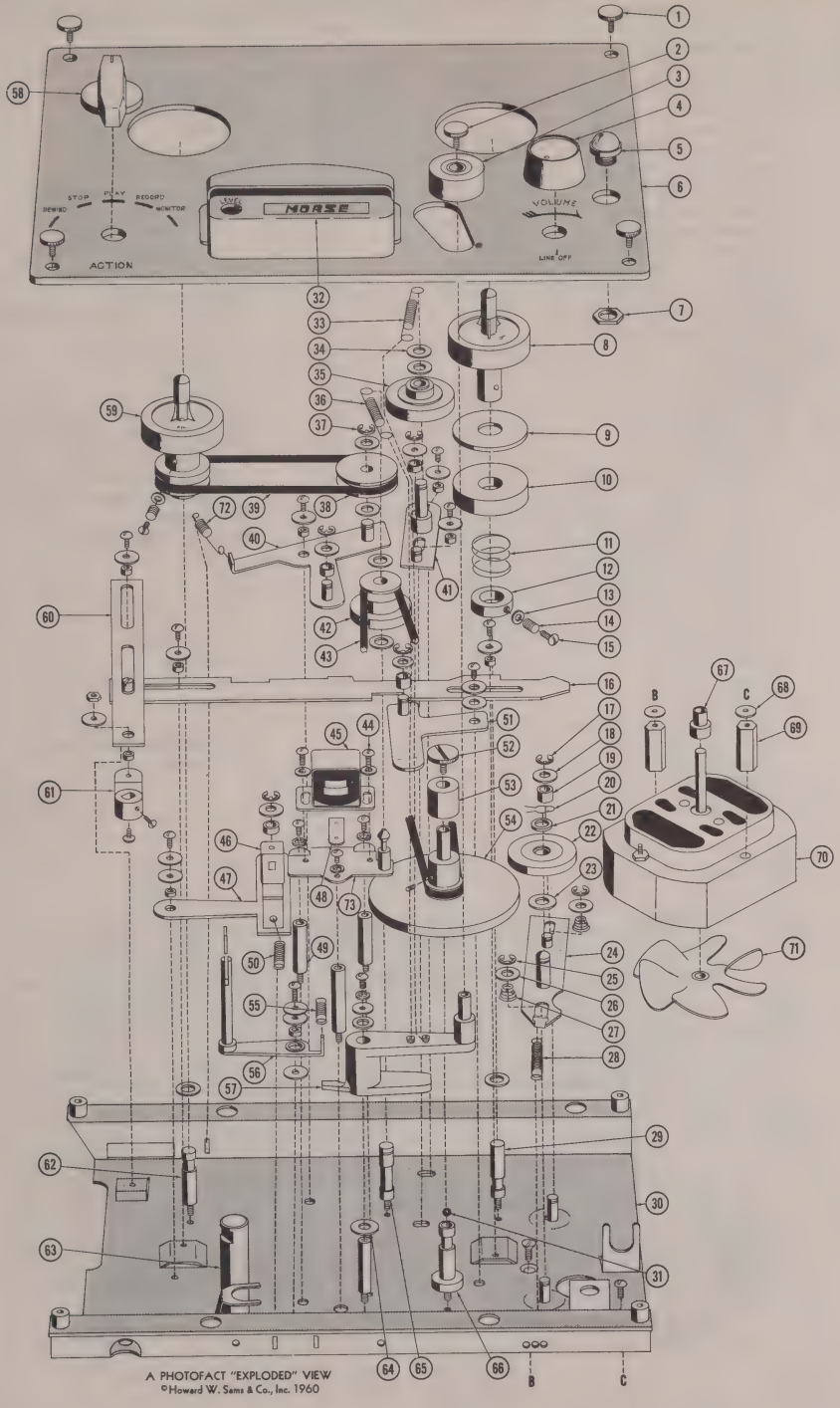
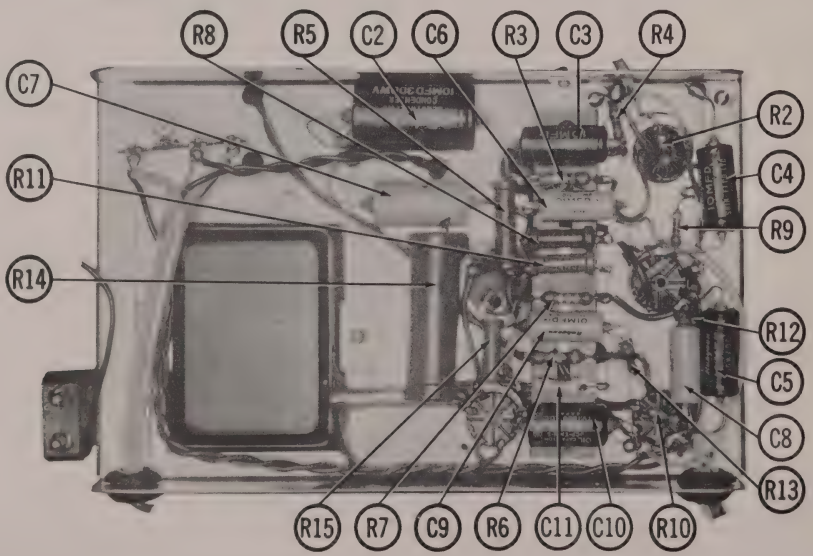


FIG. 2 EXPLODED VIEW OF PARTS

MECHANICAL PARTS LIST (CON'T.)

Ref. No.	Description
5	Pilot Lamp Jewel
6	Escutcheon
7	Hex Nut
8	Winding Reel Stand
9	Reel Stand Felt
10	Friction Wheel
11	Reel Stand Spring
12	Brass Collar
13	Washer
14	Spring
15	Screw
16	Relay Lever
17	"C" Washer
18	Washer
19	Bushing
20	Spring Clip
21	Fiber Washer
22	Motor Idler Wheel
23	Fiber Washer
24	Motor Idler Lever
25	"C" Washer
26	Washer
27	Spring
28	Motor Idler Spring
29	Winding Reel Stud
30	Baseplate
31	Ball Bearing
32	Head Cover
33	Tension Spring
34	Fiber Washer
35	Idler Wheel
36	Pressure Roller Spring
37	"C" Washer
38	Rewinding Pulley
39	Rewind Belt

Ref. No.	Description
40	Rewind Lever
41	Idler Lever
42	Pulley
43	Drive Belt
44	Screw
45	Record-Playback Head
46	Erase Head
47	Erase Head Lever
48	Head Spacer
49	Head Mounting Stud
50	Tension Spring
51	Pressure Roller Actuating Lever
52	Thumb Screw
53	7 1/2 ips Bushing
54	Flywheel
55	Tension Spring
56	Tape Cleaner Lever
57	Pressure Roller Lever
58	Action Switch Knob
59	Rewind Reel Stand
60	Plate Cam Actuating Lever
61	Plate Cam
62	Rewind Reel Stud
63	Tape Guide
64	Washer
65	Drive Pulley Stand
66	Flywheel Stand
67	Motor Pulley
68	Washer
69	Motor Spacer
70	Motor
71	Fan
72	Rewind Lever Spring
73	Head Mounting Plate



AMP CHASSIS — BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA • TYPE
V1	Preamplifier	6AV6
V2	AF Amplifier	6AU6
V3	Output	6AR5
V4	Rectifier	6X4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA MORSE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	10	350		AFH2-47	B0370	FP231	TMD-47	TVL-2750	
B	10	350							
C2	10	300		PRS1620	BR1045	TC62	TD10-450	TVA-1604	
C3	10	50		SRE50V10	BBR10-50	TC32	TD-10-50	TVA-1304	
C4	10	50		SRE50V10	BBR10-50	TC32	TD-10-50	TVA-1304	
C5	10	50		SRE50V10	BBR10-50	TC32	TD-10-50	TVA-1304	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	.01 600V		P688N-01	D6-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C7	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C8	.01 600V		P688N-01	D6-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C9	.01 600V		P688N-01	D6-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C10	.05 600V		P688N-05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5
C11	100 10%		DI-100	DD-101	L10T1	CCD-101	GP310	10TS-T10

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MORSE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½		AB-60				Volume
B	Shaft			AK-29				
C	Switch			KR-2				Power Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	500K	
R3	100K	
R4	2000Ω	
R5	750K 2W	
R6	500K	

ITEM No.	RATING	REMARKS
R7	250K	
R8	1meg	
R9	2000Ω	
R10	500K	
R11	2meg 1W	

ITEM No.	RATING	REMARKS
R12	420Ω	
R13	50K	
R14	2000Ω 2W	
R15	50K 1W	
R16	3Ω	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA MORSE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .38A Tap @ 100V	650 VCT @ .040A	6.3V @ .6A							
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 1.2A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA MORSE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	5200Ω	3-4Ω		24S51	A-2930	AU-601	A-3877	24S51	S-3X	

SPEAKER

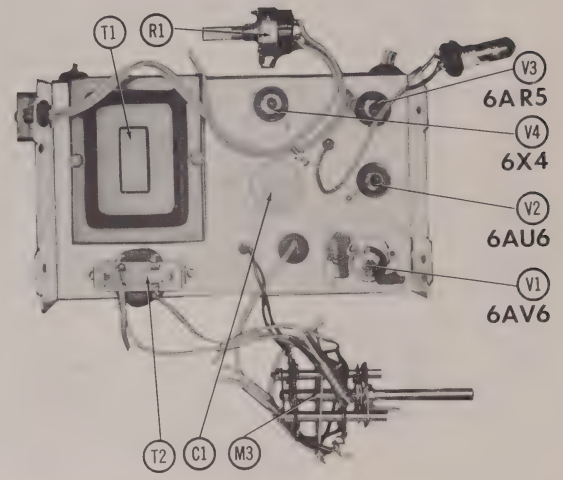
ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA MORSE PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω		4A07	

MISCELLANEOUS

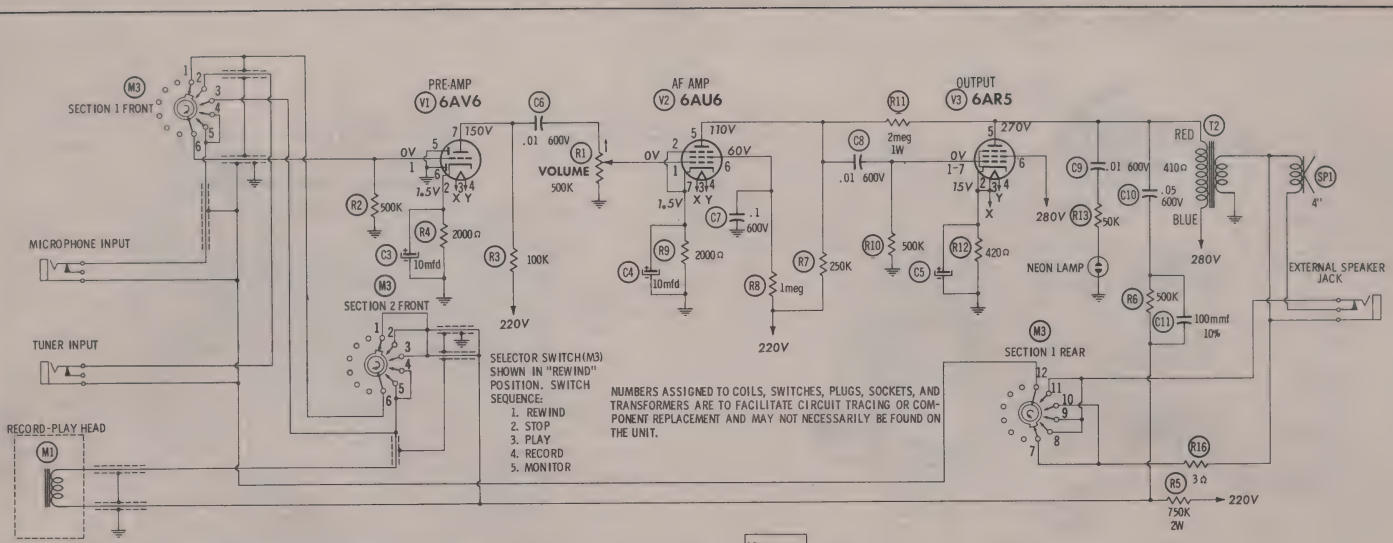
ITEM No.	PART NAME	MORSE PART No.	NOTES
M1	Head		Record-Playback
M2	Head		Erase (Permanent Magnet Type)
M3	Switch		Function Selector
M4	Motor		Drive

WIRING DATA

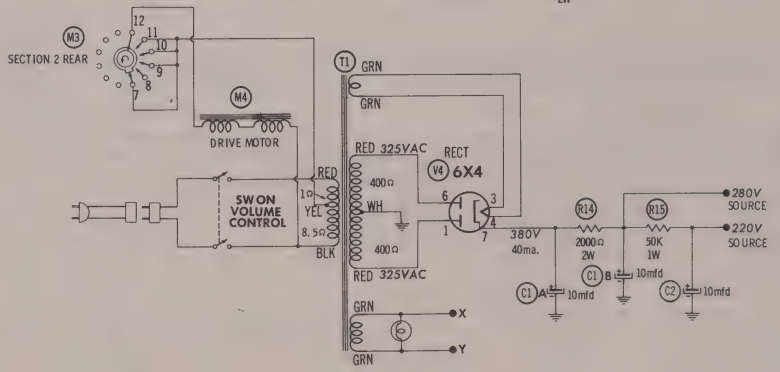
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)



AMP CHASSIS—TOP VIEW



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15%in voltage and resistance readings.
6. All controls at minimum, proper output load connected.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	6AV6	500K	2000Ω	420Ω	420Ω	0Ω	0Ω	†150K
V2	6AU6	0Ω	2000Ω	420Ω	420Ω	†300K	†1meg	2000Ω
V3	6AR5	500K	420Ω	420Ω	420Ω	†2400Ω	†2000Ω	TP
V4	6X4	400Ω	TP	INF	INF	NC	400Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT. ALL MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM PIN 7 OF V4.
NC N NO CONNECTION TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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MORSE
MODEL NL-202

PHOTOFACT® Folder with CIRCUITRACE®

MOTOROLA MODELS
C4B, P, S (Ch. HS-752)

MOTOROLA MODELS
C4B, P, S (Ch. HS-752)

MODEL C4B

MOTOROLA MODELS
C4B, P, S (Ch. HS-752)

TRADE NAME	Motorola Models C4B, C4P, C4S (Ch. HS-752)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	AC Operated 5 Tube AM Receiver With Electric Clock
POWER SUPPLY	110 - 120 Volts AC, 60 Cycles
TUNING RANGE—BROADCAST	535 —1620KC RATING 26 Watts, .25 Amp. @117 Volts AC (Less Clock)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools: A1 thru A4....GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A5.....GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to pin 7 (grid) of Converter. Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	"	1620KC	"	"	A5	"

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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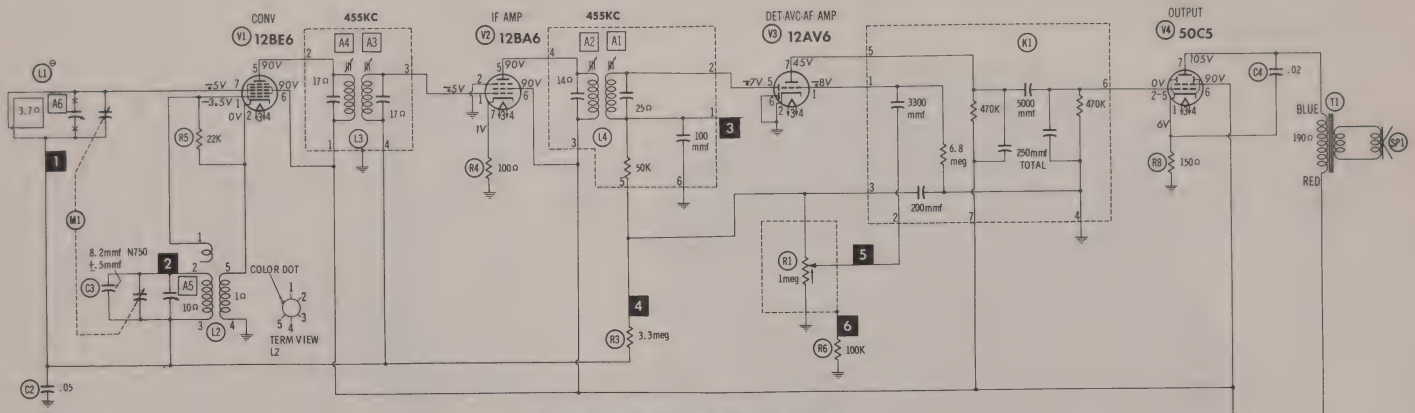
KG059

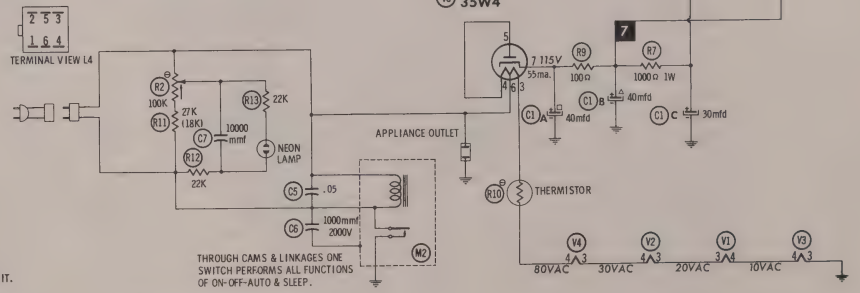
SET 494 FOLDER 11



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

TERMINAL VIEW L3

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	1Ω	30Ω	15Ω	†1100Ω	†1100Ω	4.3meg
V2	12BA6	4.3meg	0Ω	30Ω	45Ω	†1100Ω	†1100Ω	100Ω
V3	12AV6	6.8meg	0Ω	0Ω	15Ω	1meg	0Ω	†470K
V4	50C5	150Ω	470K	45Ω	105Ω	470K	†1100Ω	†290Ω
V5	35W4	NC	NC	380Ω	410Ω	410Ω	420Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V5. NC NO CONNECTION

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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MOTOROLA MODELS
C4B, P, S (Ch. HS-752)

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	Converter	12BE6
V2	IF Amplifier	12BA6
V3	Det. -AVC-AF Amp.	12AV6

ITEM No.	USE	TYPE
V4	Output	50C5
V5	Rectifier	35W4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■40	150	23B639496	PWH3-11-30	C0090 ‡	PFP311.63		PCL-3441.2	
B	▲40	150							
C	30	150							

‡ Use printed circuit adapters #55277 & 55278.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C3	8.2 N750 ± .5mmf	#21K129671						10TCC-V82
C4	.02 400V		P488N-02	DD-203	CUB4S2	4DP-2-203	GEM-412	4TM-S2
C5	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C6	1000 2000V		HVD-30-1000	DD30-102	HVB20D1	3CCD-102	2HY-210	30GA-D10
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10

Motorola Part Number.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	1meg	1/2	18B645679					Volume
R2A	100K		①	B-26	B47-25K-S	B11-121	SU-29	Dimmer
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	

① Some versions may use 30K in this application (Part #18B645789).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	3.3meg	
R4	100Ω	
R5	22K	
R6	100K	

ITEM No.	RATING	REMARKS
R7	1000Ω 1W	
R8	150Ω	
R9	100Ω	
R10	Note 1	#6B643916

ITEM No.	RATING	REMARKS
R11	27K	(18K) *
R12	22K	
R13	22K	

Note 1. Temperature compensating; 275Ω Cold, 48Ω Hot.
Motorola Part Number. * Alternate Value.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	MOTOROLA PART No.	REPLACEMENT DATA
K1	Audio Coupling	200mmf, 250mmf, 3300mmf, 5000mmf, 470K, 470K, 6.8meg	51B643849	

PRINTED BOARD

A Howard W. Sams CIRCUITRACE® Photo

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		MOTOROLA PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loop Ant.	24D646027①						
L2	Osc. Coil	24K646052						
L3	Input IF Trans.	24K641313	16-6786	16-6786	BC-356	13-PC9	RF-4	
L4	Output IF Trans.	24K646154	16-6787 *	16-6787 *	BC-357 *	13-PC10 *	RF-4 *	

① Includes Cabinet back. Part #24K646029 used on Model C4P, Part #24K646028 used on Model C4S.
* Connect 100mmf & 50K Res. externally.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2500Ω	3-4Ω	(Part of SP1)	24S53	A-3025	AU-605	A-3332	24S53	S-12X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	5"	PM	3-4Ω	50C643777①	5A1	① Includes T1

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M1	Tuning Cap.	19B646053	2 Gang
M2	Clock Assembly	1V646111	
	Printed Board	1V646103	Less All Components

CABINETS & CABINET PARTS

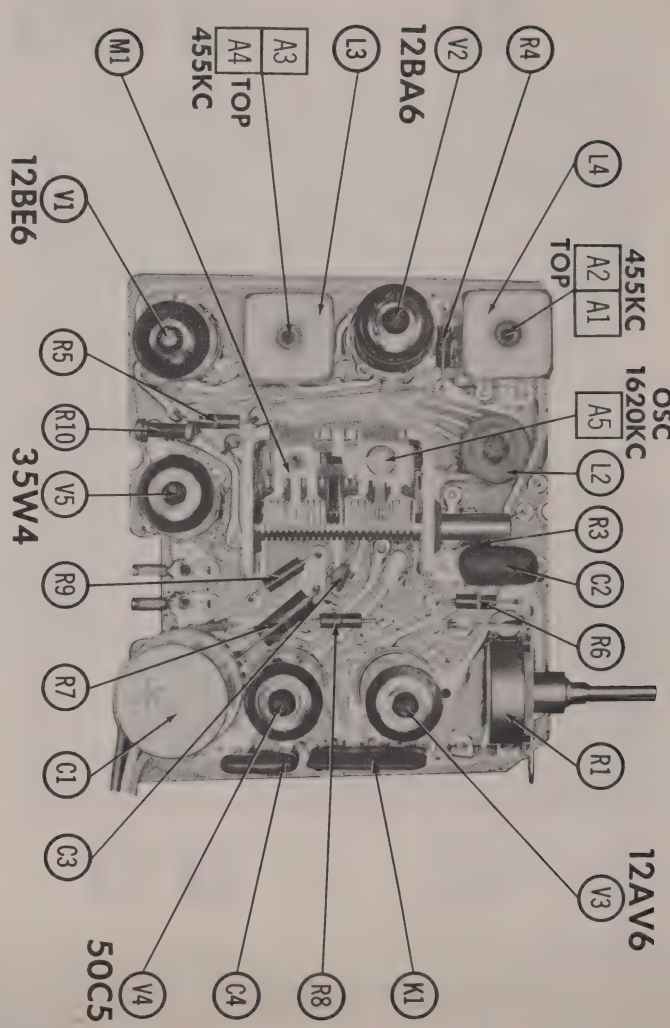
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	36K645751	Tuning, Model C4B
Knob	36K645851	Tuning, Model C4P
Knob	36C645750	Tuning, Model C4S
Knob	36B645744	Volume, Model C4B
Knob	36K645849	Volume, Model C4P
Knob	36K645745	Volume, Model C4S
Knob	36B645746	Clock
Push Button Ass'y.	1V646108	Includes Escutcheon, Springs, & Lever., Model C4B
Push Button Ass'y.	1V646110	Includes Escutcheon, Springs, & Lever., Model C4P
Push Button Ass'y.	1V646109	Includes Escutcheon, Springs, & Lever., Model C4S
Crystal	61B645749	Clock
Cabinet Assembly	1V646105	Blue, Model C4B
Cabinet Assembly	1V646107	Pink & Mauve, Model C4P
Cabinet Assembly	1V646106	Brown & Tan, Model C4S

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type) ..... Use BELDEN No. 8874

CHASSIS—TOP VIEW



PHOTOFACT® Folder

MOTOROLA
MODEL VWM60

TRADE NAME	Motorola Model VWM60 (For 1960 Volkswagen Automobiles)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated 4 Tube, 2 Transistor Custom Built Automobile AM Receiver
POWER SUPPLY	6 Volt Storage Battery RATING 2.5 Amp. @6.3 Volts DC
TUNING RANGE—BROADCAST	540 — 1610KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:
A1 thru A4..... GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A5, A6..... GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528
A8, A9, A10..... GENERAL CEMENT #9050-L, 9150
WALSCO #2521, 2524

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to antenna receptacle. Low side to chassis.	262.5KC (400∿ Mod.)	High Freq. End Stop.	Across Voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	Thru dummy (Fig. 1) to antenna receptacle.	1610KC	"	"	A5, A6, A7	"
	Step 3 is not necessary unless tuning coils have been tampered with or replaced. Back tuning cores (A8, A9, A10) out of coils but not out of coil forms. Repeat Step 2.					
3.	Thru dummy to antenna receptacle.	1200KC	Tuner carriage 9/32" from high end stop.	Across voice coil.	A8, A9, A10	Adjust for maximum output. Repeat Steps 2 and 3 until no further increase is noted. Make Step 2 the last step.
4.	With radio installed in car and antenna fully extended, tune in a weak station near 1400KC and adjust A7 for maximum output.					

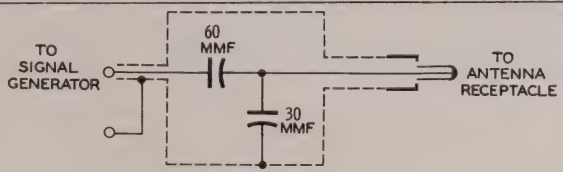


FIG. 1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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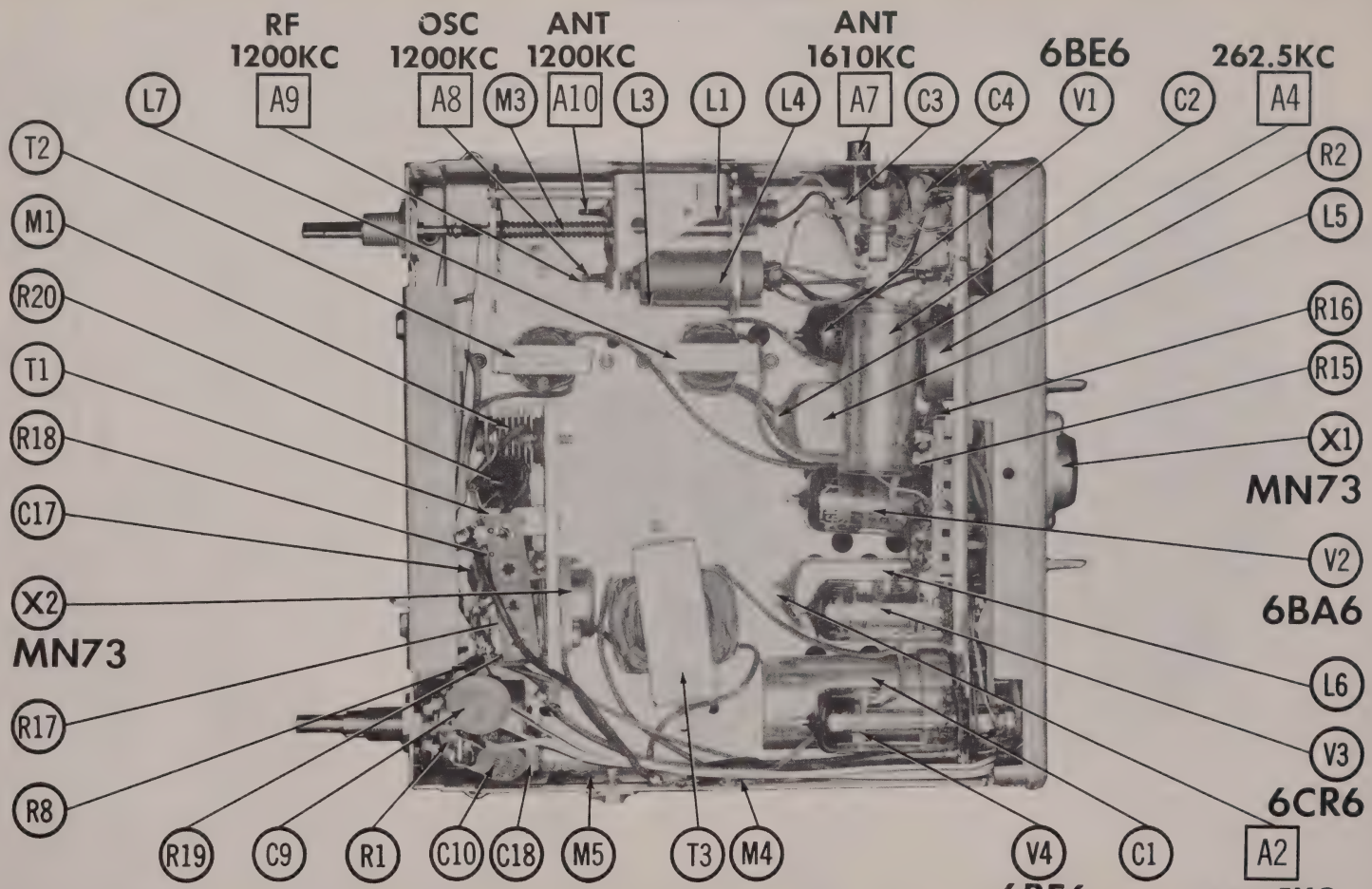
MOTOROLA
MODEL VWM60
MOTOROLA
MODEL VWM60
SET 494 FOLDER 12



CHASSIS-TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS •	GENERAL ELECTRIC •	RAYTHEON •	SYLVANIA •

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Converter	6BE6	V3	Det.-AVC-AF Amp.	6CR6
V2	IF Amplifier	6BA6	V4	AF Amplifier	6BF6

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	MN73	Output	2N155			2N176	PNP Note 1
X2	MN73	Power Oscillator	2N155			2N176	PNP Note 1

Note 1. Some versions may use 2N176 in this application.
(When replacing, apply DC-4 grease (Part #11M490487) to both sides of insulator.
Tighten mounting screws securely).

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	▪1000	8	23B543393	AFH2-77-05	BRH1210	FP115		TVL-1415	
B	▲50	150			BR5015	TC150λ		TVA-1133	
C2	50	150	23B543394	PRS1480	BR5015	TC49	TD-50-150	TVA-1414	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	40-430	#20B544017						
C4	.002 1000V		P1088N-002	DD-202	CUB10D2	16DP-1-202 424	GEM-1022	10TM-D2
C5	20-120	#20K541014						
C6	50000		BPD-05	DD-503	CUB2S5	4DP-3-503	GP150	5HK-S50
C7	47 N750		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C8	395-470	#20A485708						
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C10	2000 10%		DI-2000		CUB6D2	CCD-202	GP220	10TS-D20
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C12	.05 200V		P288N-05	DD-503	CUB2S5	4DP-3-503	GEM-415	2TM-S5
C13	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C14	330		BPD-00033	DD-331	L10T33	CCD-331	GP330	10TS-T33
C15	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C16	25000					4DP-2-253	GEM-4125	5HK-S25
C17	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C18	.5 100V		P288N-5		CUB2P5	2DP-5-504	GEM-205	2TM-P5

Motorola Part Number.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	2meg	½	18K544000	F1-68				Tone
B	2meg			R2-75				Volume
	1meg Tap							
C	Bushing			AK-31				
D	Switch			KR-4				Power Off-On
R2	125Ω	2(WW)	18K542493		39-125	112-150	FL-150	Bias

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	3.3meg	
R4	3.3meg	
R5	1.2meg	
R6	47K	
R7	220Ω	(180Ω) *
R8	100K	

ITEM No.	RATING	REMARKS
R9	220K	
R10	1meg	
R11	1meg	
R12	10meg	
R13	1meg	
R14	1000Ω	

ITEM No.	RATING	REMARKS
R15	10Ω Cold	#6K543800
R16	5.6Ω 1W	
R17	56Ω	
R18	2700Ω	
R19	.47Ω 1W	
R20	Temp. Comp.	#6A543419

* Alternate Value.
# Motorola Part Number.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		MOTOROLA PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Coil	24K562246						①
L2	RF Choke	24K539955						
L3	RF Coil	24K562245						
L4	Osc. Coil	24K562244						
L5	Input IF Trans.	24B543286	16-6752	16-6752	BC-350	12-H1	RF-3	
L6	Output IF Trans.	24K543287	16-6754	16-6754	BC-354	12-H6		

① Includes Cap.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ∿)	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L7	.600A	.5Ω	.002 HY	25B543396-0 ①						

① Alternate Part #25B543396.

TRANSFORMER (OSC.)

ITEM No.	RATING			REPLACEMENT DATA						
	INPUT	OUTPUT		MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	6.3V ⓐ .45A	55V ⓐ .010A		25C543395-B①						

① Alternate Part #25C543395.

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	22	1	25B543386						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T3	5Ω	3-4Ω	25C543416-B ①							

① Alternate Part #25C543416.

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	5"	PM	3-4Ω	50C543225	5A15	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					
	CURRENT (Measured)	MOTOROLA PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.010A	48K543405 *	T065 *	1234AH *	65A *	SR200 ♦	* Selenium Type ♦ Silicon Type

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	9A 32V	65R16248	9K541991	307009 (SFE 9A 32V)	155009	SFE9	HRH

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	Tuner	77K563073	(MT-300) Complete
M4	Spark Plate	64K530177	
M5	Spark Plate	64K530177	

CABINETS & CABINET PARTS

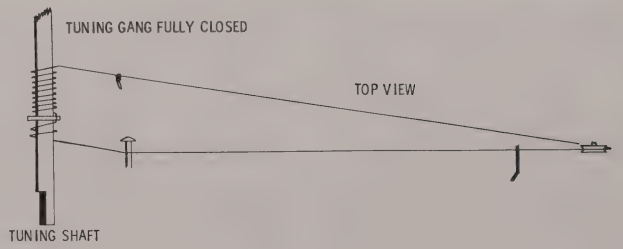
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

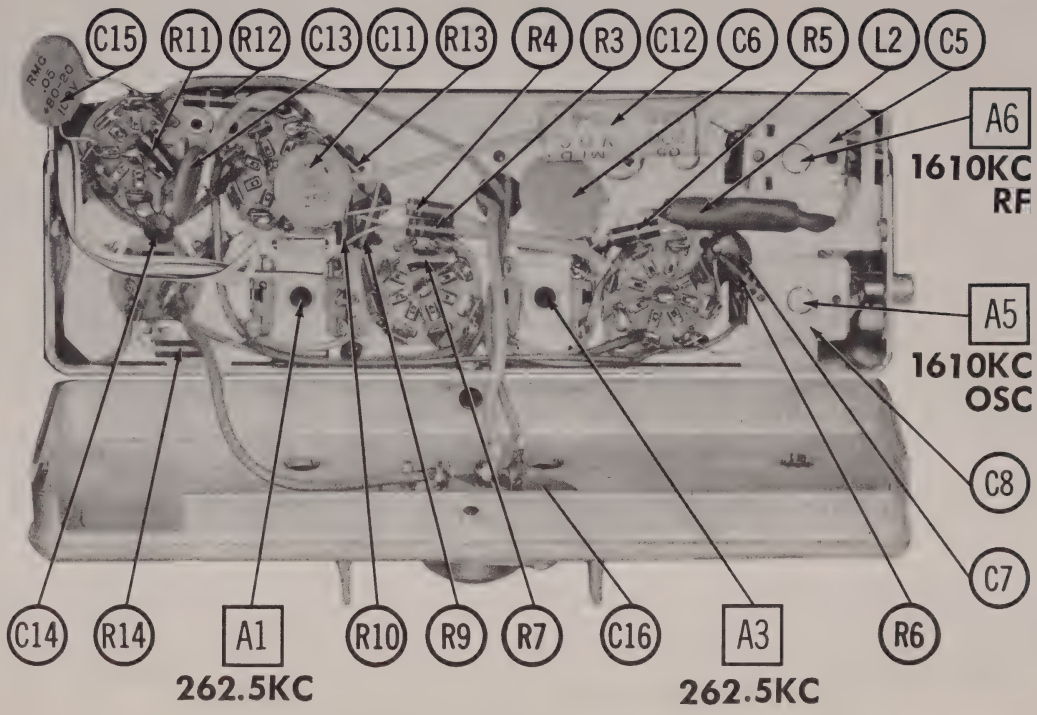
NAME	PART NO.	DESCRIPTION
Knob	36K542973	Tuning, Volume
Knob	36B522020	Tone
Knob	36K542005	Dummy
Pointer	1K543277	
Dial Scale	34B543390	

WIRING DATA

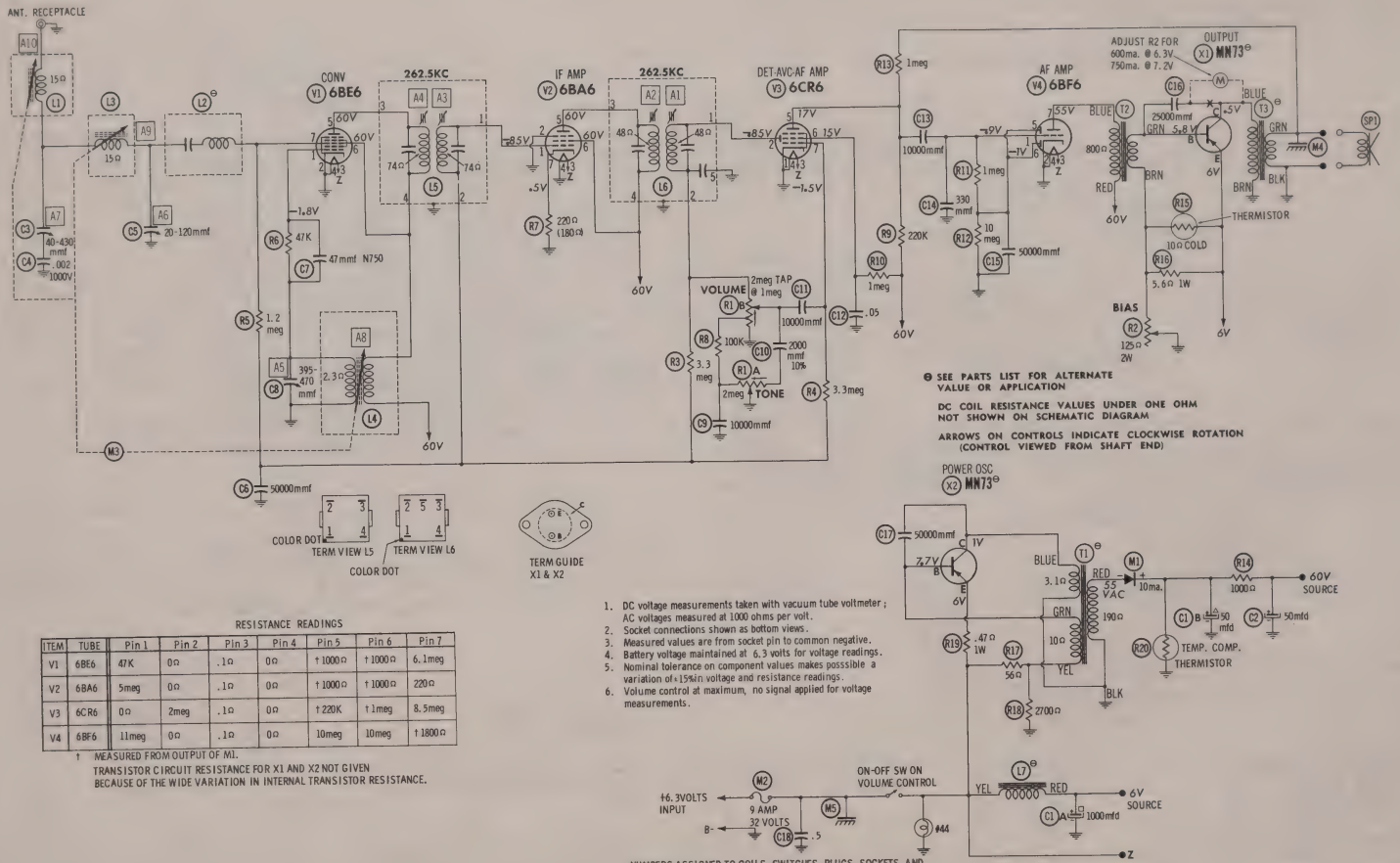
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire	Use BELDEN No. 8885
Bonding Strap	Use BELDEN No. 8661

DIAL CORD STRINGING





CHASSIS - END VIEW



⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	6BE6	47K	0Ω	.1Ω	0Ω	†1000Ω	†1000Ω	6.1meg
V2	6BA6	5meg	0Ω	.1Ω	0Ω	†1000Ω	†1000Ω	220Ω
V3	6CR6	0Ω	2meg	.1Ω	0Ω	†220K	†1meg	8.5meg
V4	6BF6	11meg	0Ω	.1Ω	0Ω	10meg	10meg	†1800Ω

† MEASURED FROM OUTPUT OF M1.
TRANSISTOR CIRCUIT RESISTANCE FOR X1 AND X2 NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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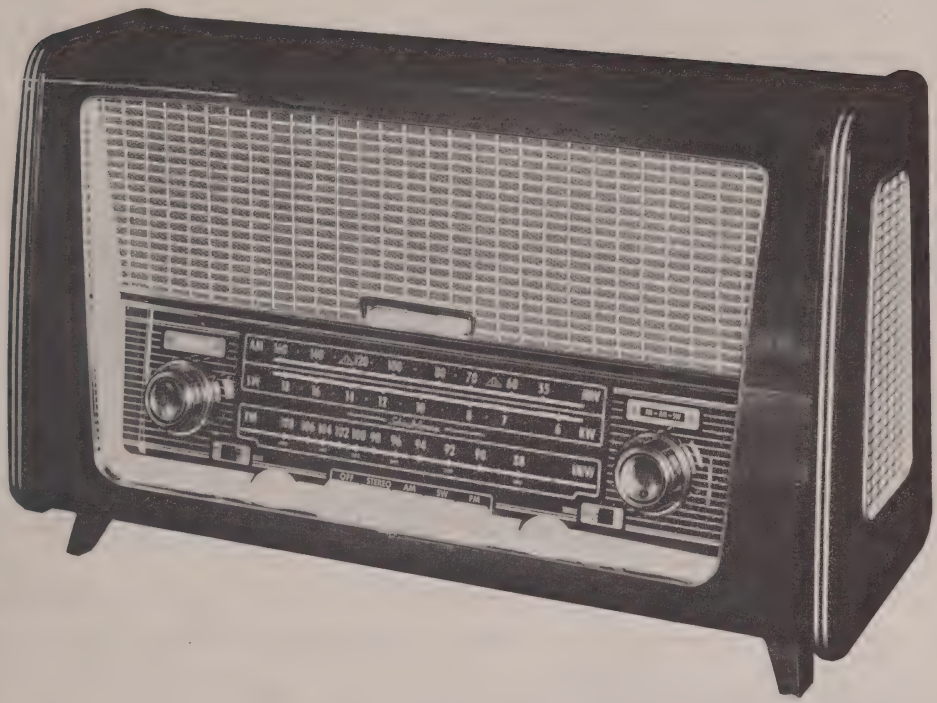
MOTOROLA MODEL VWM60

PHOTOFACT® Folder

OLYMPIC CONTINENTAL
MODEL Tivoli 300

OLYMPIC CONTINENTAL
MODEL Tivoli 300



OLYMPIC CONTINENTAL
MODEL Tivoli 300

TRADE NAME	Olympic-Continental Model Tivoli 300
MANUFACTURER	Olympic, A Div. of the Siegler Corp., 34-01 38th Street, Long Island City 1, N. Y.
TYPE SET	AC Operated 6 Tube FM-BC-SW Receiver
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 68 Watts, .77 Amp. @ 117 Volts AC
TUNING RANGES — BROADCAST	510 - 1640KC FREQ. MOD. 88 — 108MC SHORT WAVE 5.77 - 18.8MC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of JK801

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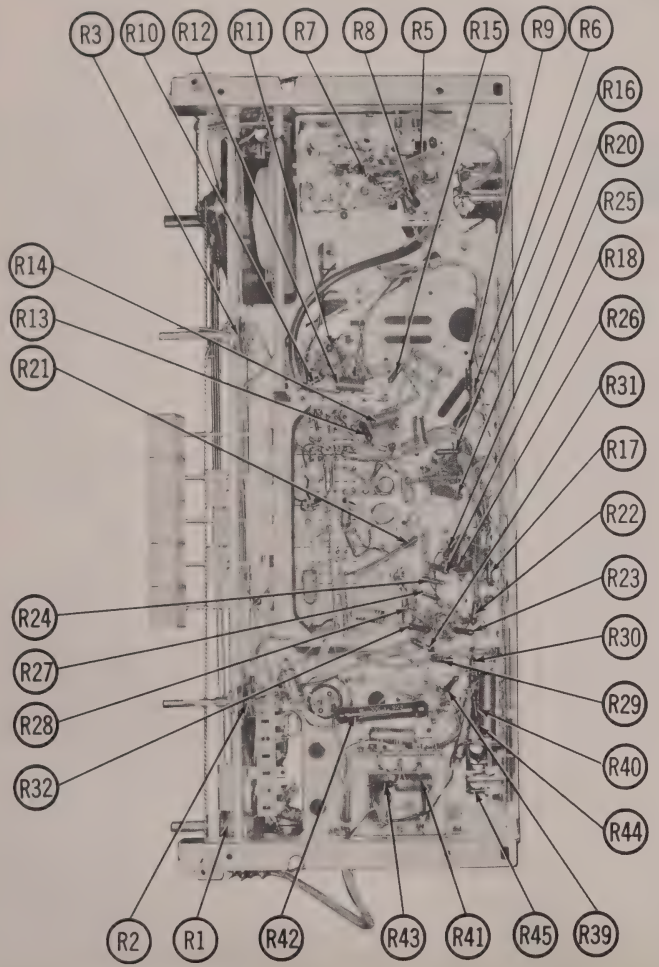
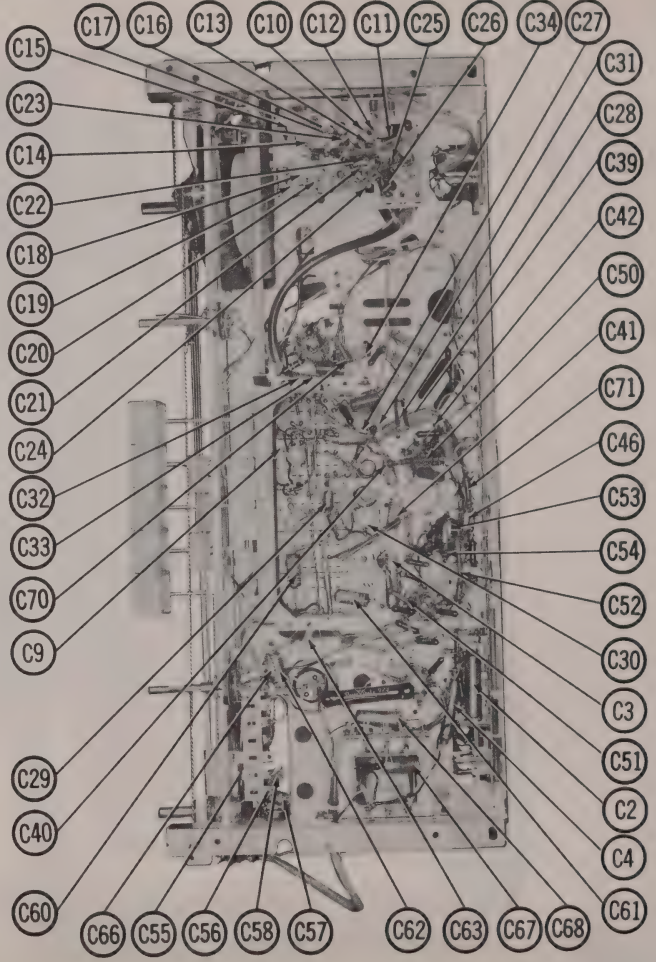
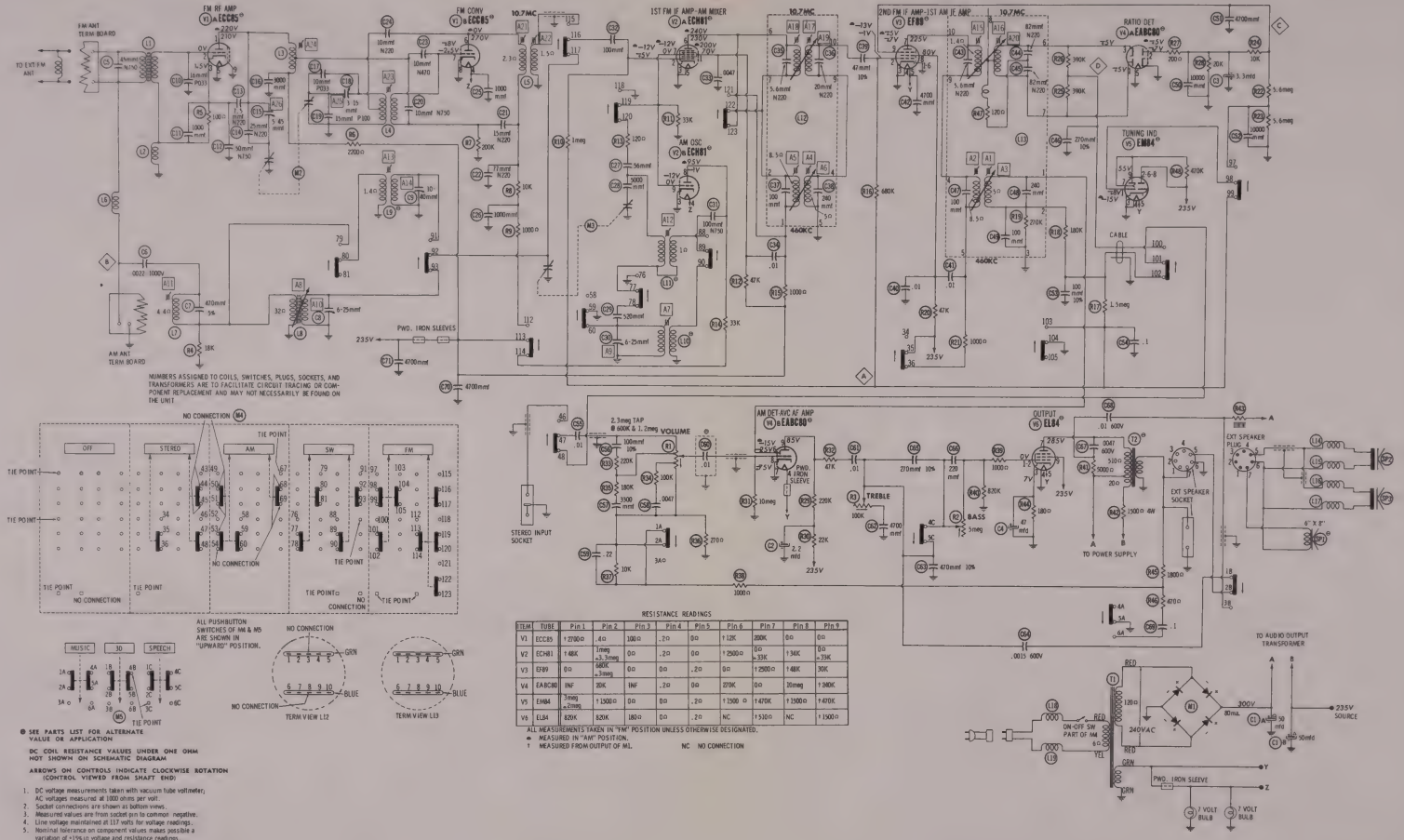


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC85	†2700Ω	.4Ω	100Ω	.2Ω	0Ω	†12K	200K	0Ω	0Ω
V2	ECH81	†48K	1meg ±3.3meg	0Ω	.2Ω	0Ω	†250Ω	0Ω ±33K	†34K	0Ω ±33K
V3	EF80	0Ω	680K ±3meg	0Ω	0Ω	.2Ω	0Ω	†250Ω	†48K	30K
V4	EABC80	INF	20K	INF	.2Ω	0Ω	270K	0Ω	10meg	†240K
V5	EM84	3meg ±2meg	†1500Ω	0Ω	0Ω	.2Ω	†1500Ω	†470K	†1500Ω	†470K
V6	EL84	820K	820K	180Ω	0Ω	.2Ω	NC	†510Ω	NC	†1500Ω

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
⊕ MEASURED IN "AM" POSITION.
† MEASURED FROM OUTPUT OF M1. NC NO CONNECTION

⊕ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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OLYMPIC CONTINENTAL MODEL Tivoli 300

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:
A9, A10, A14... GENERAL CEMENT #8607, 9291, 9294
WALSCO #2520, 2522, 2523, 2524, 2534, 2537
A25, A26..... GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538

AM ALIGNMENT – SELECTOR IN AM POSITION

Connect the negative lead of a 2.5 volt bias supply to point (A). Positive to chassis.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru 5000mmf to pin 2 (grid) of AM Mixer. Low side to chassis.	460KC (400∿ Mod.)	(AM) Tuning gang fully open.	Across voice coil.	A1, A2, A3	Decrease coupling (A3) by turning counterclockwise. Adjust A1 and A2 for maximum output. Adjust A3 for maximum output then back counter-clockwise about 1/2 turn.
2.	"	"	"	"	A4, A5, A6	Decrease coupling (A6) by turning counterclockwise. Adjust A4 and A5 for maximum output. Adjust A6 for maximum output then back counter-clockwise about 1/2 turn.
3.	High side thru 120mmf and 400Ω in series to point (B). Low side to chassis.	555KC	555KC	"	A7, A8	Adjust for maximum output.
4.	"	1500KC	1500KC	"	A9, A10	"
5.	"	460KC	1000KC	"	A11	Adjust for MINIMUM output.
6.	"	6MC	(SW) 6MC	"	A12, A13	Adjust for maximum output.
7.	"	16.5MC	(SW) 16.5MC	"	A14	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM—SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	High side to ungrounded tube shield floating over FM Converter tube. Low side to chassis.	10.7MC (Unmod.)	(FM) 91MC	DC probe to point (C). Common to chassis.	A15	Detune A20 by turning counterclockwise. Adjust A15 for maximum deflection.
9.	"	"	"	DC probe to point (D). Common to chassis.	A16	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
10.	"	"	"	DC probe to point (C). Common to chassis.	A17, A18, A19	Detune A19 by turning counterclockwise. Adjust A17 and A18 for maximum deflection. Adjust A19 for maximum deflection then turn counterclockwise one half turn.
11.	"	10.7MC (400∿ 30% AM Mod.)	"	Output meter across voice coil.	A20	Adjust for MINIMUM deflection. Repeat steps 8 and 9 without disturbing A20.
12.	"	10.7MC (Unmod.)	"	DC probe to point (C). Common to chassis.	A21, A22	Adjust for maximum deflection.

FM RF ALIGNMENT—SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
13.	Across FM antenna terminals.	98.4MC	FM 98.4MC	DC probe to point (C). Common to chassis.	A23, A24	Adjust for maximum deflection.
14.	"	89.1MC	89.1MC	"	A25, A26	"

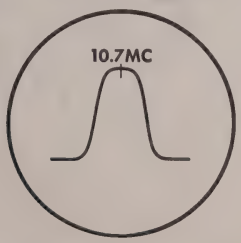


FIG. 1

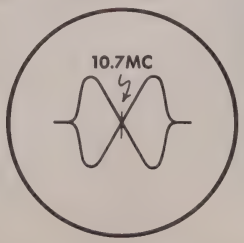
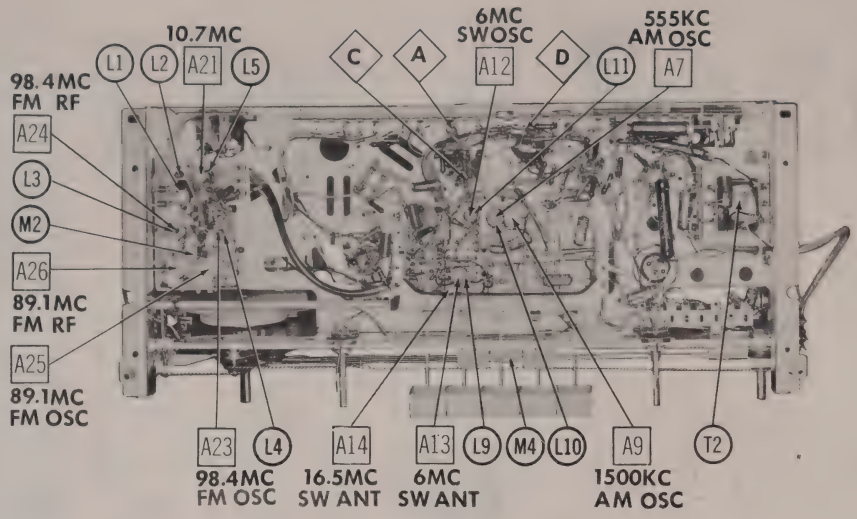
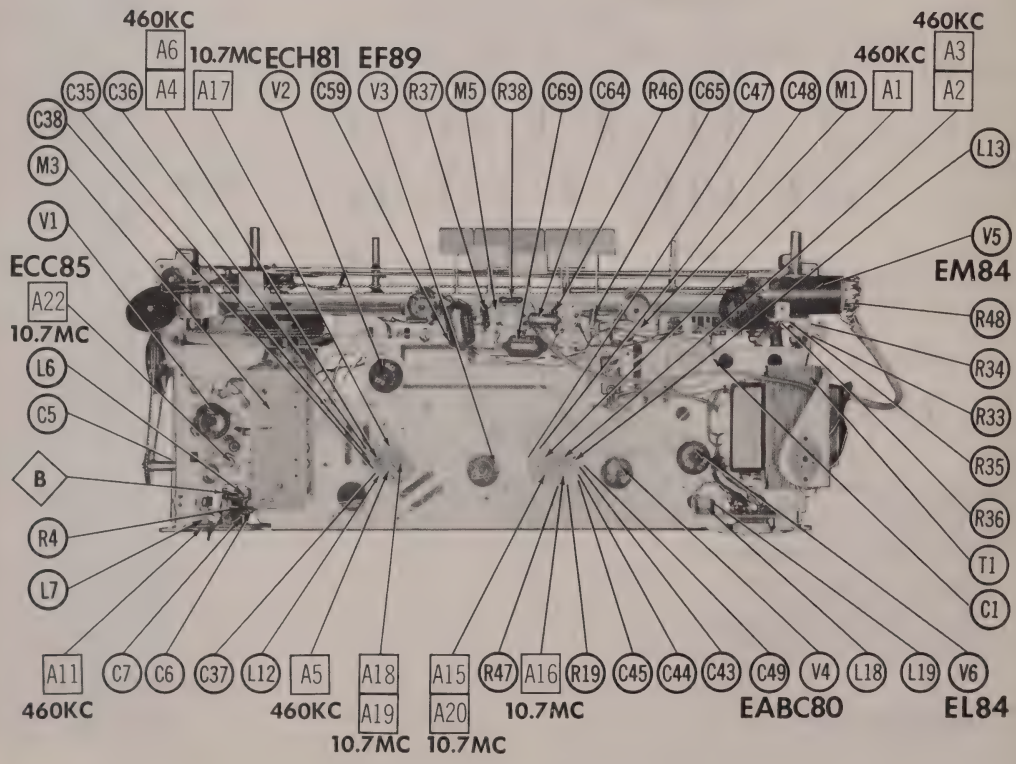


FIG. 2



CHASSIS BOTTOM VIEW—ALIGNMENT, INDUCTOR & MISC. IDENT.



CHASSIS—TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE (CBS / GENERAL ELECTRIC / RAYTHEON / SYLVANIA)
V1	FM RF Amp. -FM Conv.	ECC85 (ECC85/6AQ8)*
V2	1st FM IF Amp. - AM Mixer-AM Osc.	ECH81 (ECH81/6AJ8)*
V3	2nd FM IF Amp. - 1st AM IF Amp.	EF89 (EF89/6DA6)*
V4	Ratio Det. -AM Det. - AVC-AF Amp.	EABC80 (EABC80/6T8)*
V5	Tuning Indicator	EM84 (EM84/6BR8) *
V6	Output	EL84 (EL84/6BQ5) *

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA OLYMPIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	50	350	COG30117						
B	50	350							
C2	2.2	350	COG30118	PRS1705	BR245	TT350X2	TD-2-450	TVA-1701	
C3	3.3	70	COG30151	PRS1400	BBR4-150	TT80X4	TD-4-150	TE-1403	
C4	47	12	COG30152	SRE12V50	BBR50-25	TT15X50	TD-50-25	TE-1133	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	45 N750		N750-SI 47	TCN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C6	.0022 1000V		P1088N-0022	DD-222	CUB10D22	16DP-2-222	GEM-10247	10TM-D22
C7	470 5%				5R5T47	CM-19B-471J	MCJ244	MS-347
C8	6-25							
C9	10-40							
C10	16 P033							
C11	1000		SI 1000	D6-102	BYA10D1	CCD-102	B-210	5HK-D10
C12	50 N750		N750-SI 50	TCN-50	C10Q5U	CCTN-470	CN7-447	10TCU-Q47
C13	7.5 N220							
C14	25 N220							10TCR-Q27
C15	5-45							
C16	3000		BPD-0033	DD-302	BYA10D3	CCD-302	B-230	5HK-D30
C17	10 P033							
C18	3-15							
C19	15 P100							
C20	10 N750		N750-SI 10	TCN-10	C10Q1U	CCTN-100	CN7-410	10TCU-Q1
C21	15 N220					*		10TCR-Q15
C22	77 N220					*		
C23	10 N470					*		
C24	10 N220					*		10TCR-Q10
C25	1000		SI 1000	D6-102	BYA10D1	CCD-102	B-210	5HK-D10
C26	1000		SI 1000	D6-102	BYA10D1	CCD-102	B-210	5HK-D10
C27	56		SI 56	D6-560	L10Q56	CCD-560	GP468	10TS-Q56
C28	5000		SI 5000	D6-502	BYA10D5	CCD-502	B-250	5HK-D50
C29	520		SI 510	DD-511	L10T51	CCD-501	GP350	10TS-T50
C30	6-25							
C31	100 N750		N750-SI 100	TCN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C32	100		SI 100	D6-101	L10T1	CCD-101	GP310	10TS-T10
C33	.0047 200V		P288N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C34	.01 200V		P288N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C35	5.6 N220					*		10TCR-V56
C36	20 N220					*		10TCR-Q20
C37	100		SI 100	D6-101	L10T1	CCD-101	GP310	10TS-T10
C38	240		SI 240	D6-251	L10T24	CCD-251	GP324	10TS-T24
C39	47 10%		NPO-SI 47	D6-470	L10Q47	CCD-470	GP447	10TS-Q47
C40	.01 200V		P288N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C41	.01 200V		P288N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C42	4700		SI 4700	D6-472	BYA10D47M	CCD-472	B-247	5HK-D47
C43	5.6 N220					*		10TCC-V56
C44	82 N220					*		10TCR-Q82

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C45	82 N220					*		10TCR-Q82
C46	270 10%		NPO-SI 270	D6-271	L10T27	CCD-271	GP327	10TS-T27
C47	100		SI 100	D6-101	L10T1	CCD-101	GP310	10TS-T10
C48	240		SI 240	D6-251	L10T24	CCD-251	GP324	10TS-T24
C49	100		SI 100	D6-101	L10T1	CCD-101	GP310	10TS-T10
C50	10000		SI 10000	D6-103	BYA10S1	CCD-103	B-110	5HK-S10
C51	4700		SI 4700	D6-472	BYA10D47M	CCD-472	B-247	5HK-D47
C52	10000		SI 10000	D6-103	BYA10S1	CCD-103	B-110	5HK-S10
C53	100 10%		NPO-SI 100	D6-101	L10T1	CCD-101	GP310	10TS-T10
C54	.1 250V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C55	.01 200V		P288N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C56	100 10%		NPO-SI 100	D6-101	L10T1	CCD-101	GP310	10TS-T10
C57	3300		SI 3300	D6-332	BYA10D33	CCD-332	B-233	5HK-D33
C58	.0047 200V		P288N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C59	.22 250V		P488N-22		CUB4P22	4DP-5-224	GEM-4022	4TM-P22
C60	.01 200V	Note 1						
C61	.01 200V		P288N-01	D6-103	CUB4S1	4DP-1-103	GEM-401	4TM-S1
C62	4700		SI 4700	D6-472	BYA10D47M	CCD-472	B-247	5HK-D47
C63	470 10%			D6-471	5R5T47	CCD-471	GP347	10TS-T47
C64	.0015 600V		P688N-0015	D6-152	6TM-D15	6DP-1-152	GEM-6215	6TM-D15
C65	270 10%		NPO-SI 270	D6-271	L10T27	CCD-271	GP327	10TS-T27
C66	220		SI 220	D6-221	L10T22	CCD-221	B-220	10TS-T22
C67	.0047 600V		P688N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C68	.01 600V		P688N-01	D6-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C69	.1 250V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-411	4TM-P1
C70	4700		SI 4700	D6-472	BYA10D47M	CCD-472	B-247	5HK-D47
C71	4700		SI 4700	D6-472	BYA10D47M	CCD-472	B-247	5HK-D47

Note 1. Shielded unit.

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA OLYMPIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2.3meg*	1/2	PTG30081	BT-175				Volume
B	Bushing			AK-29				
R2	5meg	1/2	PTG30083					Bass
R3	100K		PTG30082					Treble

* Taps @ 600K & 1.2meg.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	18K	
R5	100Ω	
R6	2200Ω	
R7	200K	
R8	10K	
R9	1000Ω	
R10	1meg	
R11	33K	
R12	47K	
R13	120Ω	
R14	33K	
R15	1000Ω	
R16	680K	
R17	1.5meg	
R18	180K	

ITEM No.	RATING	REMARKS
R19	270K	
R20	47K 1W	
R21	1000Ω	
R22	5.6meg	
R23	5.6meg	
R24	10K	
R25	390K	
R26	390K	
R27	200Ω	
R28	20K	
R29	220K	
R30	22K	
R31	10meg	
R32	47K	
R33	220K	

ITEM No.	RATING	REMARKS
R34	100K	
R35	180K	
R36	270Ω	
R37	10K	
R38	1000Ω	
R39	1000Ω	
R40	820K	
R41	5000Ω	
R42	1500Ω	
R43	100K	
R44	180Ω	
R45	1800Ω	
R46	470Ω	
R47	120Ω	
R48	470K	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		OLYMPIC PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Ant. Trans.	CKG30127						
L2	Cathode Choke	CKG30122						
L3	FM RF Coil							
L4	FM Osc. Coil							
L5	1st FM IF Trans.	CLG30106						
L6	RF Choke	CKG30123	19-1008	19-1008	SW-631	4520		5uh
L7	IF Trap Coil	CLG30142						
L8	Loopstick	LPG30107			BC-419			
L9	SW Ant. Trans.	①						
L10	AM Osc. Coil	①						
L11	SW Osc. Coil	①						
L12A	2nd FM IF Trans.	TRG30218						
B	1st AM IF Trans.							
L13A	Ratio Det.	TRG30111						
B	2nd AM IF Trans.							
L14	Tone Choke	CKG30123	19-1008	19-1008	SW-631	4529		5uh
L15	Tone Choke	CKG30123	19-1008	19-1008	SW-631	4529		5uh
L16	Tone Choke	CKG30123	19-1008	19-1008	SW-631	4529		5uh
L17	Tone Choke	CKG30123	19-1008	19-1008	SW-631	4529		5uh
L18	Line Choke		19-6033	19-6033				30uh
L19	Line Choke		19-6033	19-6033				30uh

① Part of M4.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .77A	240V @ .080A	6.3V @ 2.4A	TRG30080						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6300Ω Tap @ 250Ω	3-4Ω	TRG30075							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	OLYMPIC PART No.	QUAM PART No.	
SP1	6"x 8"	PM	3-4Ω	SKG30078		① Alternate Part #SKG30079
SP2	Electrostatic			SKE25268①		
SP3	Electrostatic			SKE25268①		

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	OLYMPIC PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.080A	RFG30088 *					* Selenium Bridge

MISCELLANEOUS

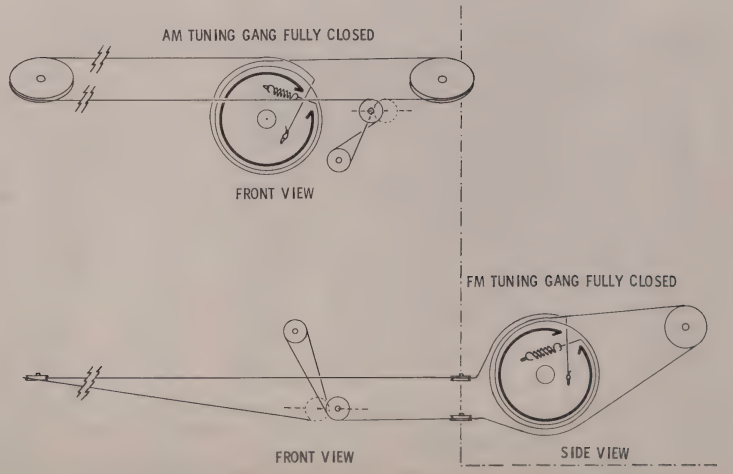
ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M2	Tuning Cap.	CVG30114	FM 2 Gang
M3	Tuning Cap.	CVG30150	AM 2 Gang
M4	Switch	PBG30161	Function (Pushbutton Type, Includes Off, Stereo, AM, SW, & FM)
M5	Switch	PBG30162	Tone (Pushbutton Type, Includes Music, 3D, & Speech)
	FM Tuning Unit	CVG30138	Complete

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

DIAL CORD STRINGING



PHOTOFACT® Folder with CIRCUITRACE®

ROBIN
MODEL TR-605

ROBIN
MODEL TR-605

ROBIN
MODEL TR-605

TRADE NAME	Robin Model TR-605		
IMPORTER	Capital Appliance Distributor Div. of Capital Paper Co., 1201 W. Washington St., Indianapolis, Ind.		
TYPE SET	Battery Operated Transistorized Portable AM Receiver		
POWER SUPPLY	9 Volts DC	RATING	8MA @ 9 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	535 — 1605KC		20MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:
A1, A2, A3, A5.... GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538
A4, A6..... GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	1600KC	1600KC	"	A4	"
3.	"	600KC	600KC	"	A5	"
4.	"	1400KC	1400KC Signal	"	A6	"

SET 494 FOLDER 14

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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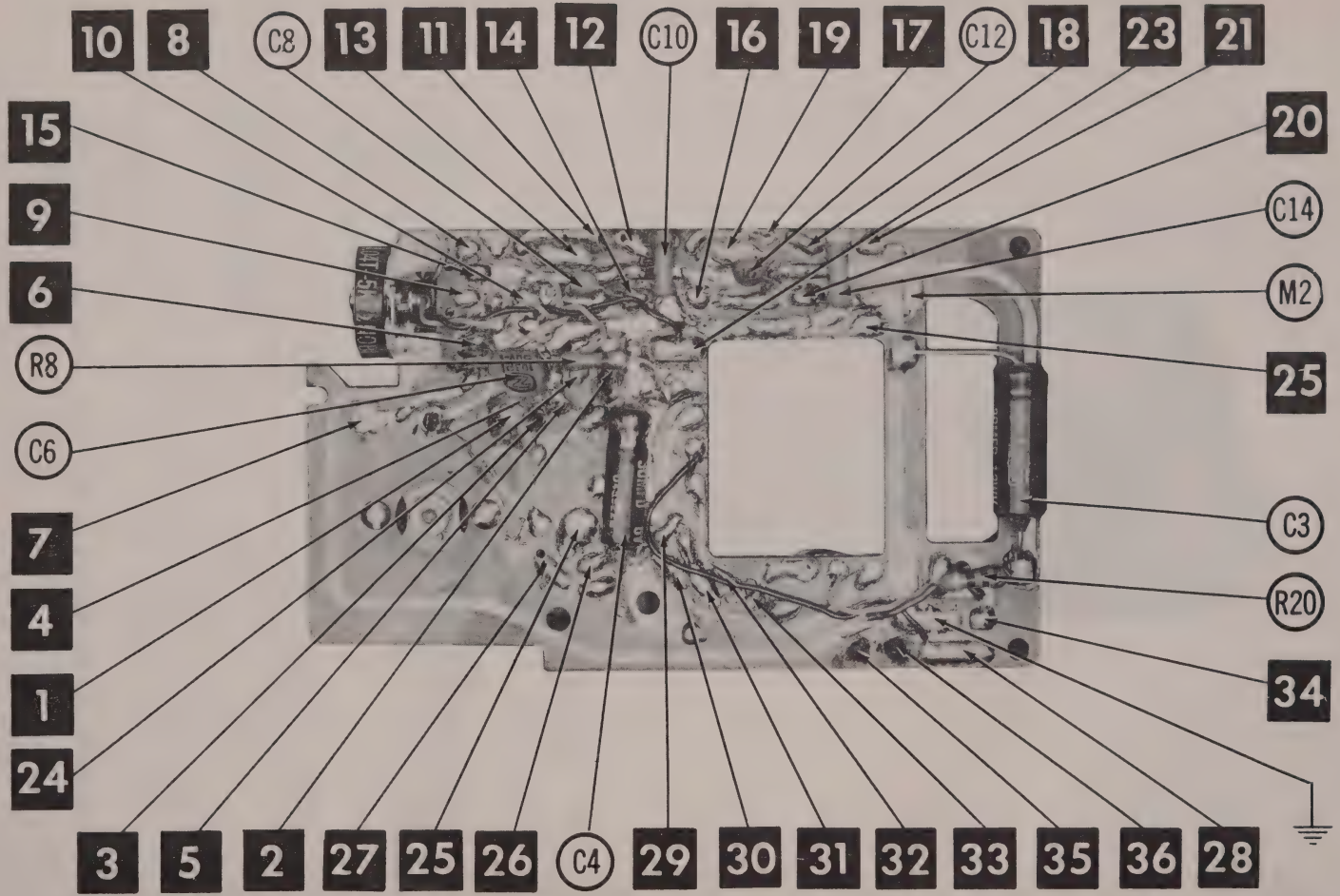

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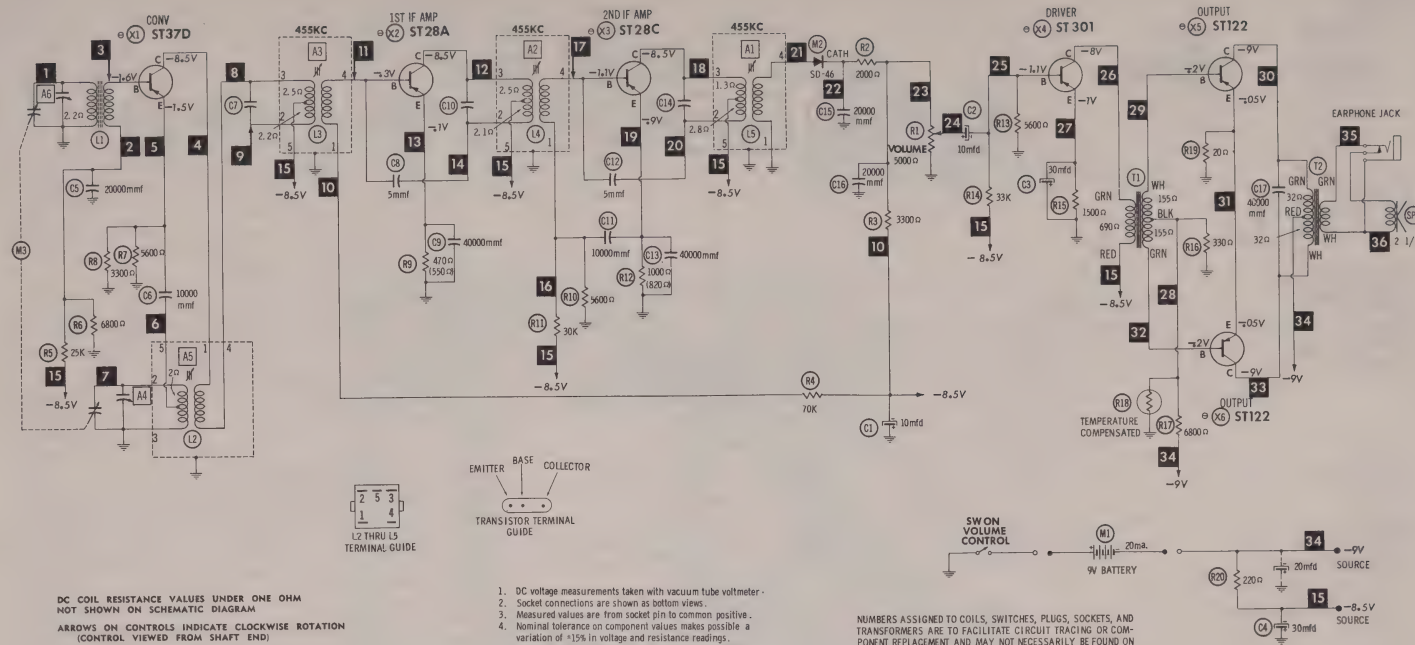
PRINTED BOARD



DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common positive.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with CIRCUITRACE

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ROBIN
MODEL TR-605

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	ST-37D①	Converter					PNP
X2	ST-28A②	1st IF Amplifier					PNP
X3	ST-28C③	2nd IF Amplifier					PNP
X4	ST-301④	Driver					PNP
X5	ST-122⑤	Output					PNP \ Matched
X6	ST-122⑤	Output					PNP / Pair

① Alternate Types may be used, ST-37C, 2S159.
② Alternate Types may be used, ST-28C, 2S155.
③ Alternate Types may be used, ST-28A, 2S155.
④ Alternate Types may be used, ST-302, ST-332.
⑤ Alternate Types may be used, ST-332.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	ROBIN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	10	6		XPP-6010	NLW10-6	TT6X10	ML10-6	TE-1087	
C2	10	6		XPP-6010	NLW10-6	TT6X10	ML10-6	TE-1087	
C3	30	6		XPP-6030	NLW30-6	TT6X30	ML30-6	TE-1092	
C4	30	12		XPP-12030	NLW30-15	TT15X30	ML30-15	TE-1158	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA						
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	20000		C80V203AM	DDM-203	H-05S2		TA-120	TG-S20	
C6	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10	
C7									
C8	5		NPO-DI 5.0	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50	
C9	40000								
C10									
C11	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10	
C12	5		NPO-DI 5.0	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50	
C13	40000								
C14									
C15	20000		C80V203AM	DDM-203	H-05S2		TA-120	TG-S20	
C16	20000		C80V203AM	DDM-203	H-05S2		TA-120	TG-S20	
C17	40000								

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ROBIN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/4		B16-214				Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	2000Ω	
R3	3300Ω	
R4	70K	
R5	25K	
R6	6800Ω	
R7	5600Ω	
R8	3300Ω	

ITEM No.	RATING	REMARKS
R9	470Ω	(550Ω) *
R10	5600Ω	
R11	30K	
R12	1000Ω	(820Ω) *
R13	5600Ω	
R14	33K	
R15	1500Ω	

ITEM No.	RATING	REMARKS
R16	330Ω	
R17	6800Ω	
R18	Temp. Comp.	
R19	20Ω	
R20	220Ω	

* Alternate Value.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		ROBIN PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick							
L2	Osc. Coil							
L3	1st IF Trans.							
L4	2nd IF Trans.							
L5	3rd IF Trans.							

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ROBIN PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1	1							

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	ROBIN PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	175Ω CT	6-8Ω								

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ROBIN PART No.	QUAM PART No.	
SP1	2½"	PM	6-8Ω		25A07Z10.5	

BATTERIES

ITEM No.	VOLTAGE	ROBIN PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V	006P		2U6		216		M-1604	

CRYSTAL DIODES

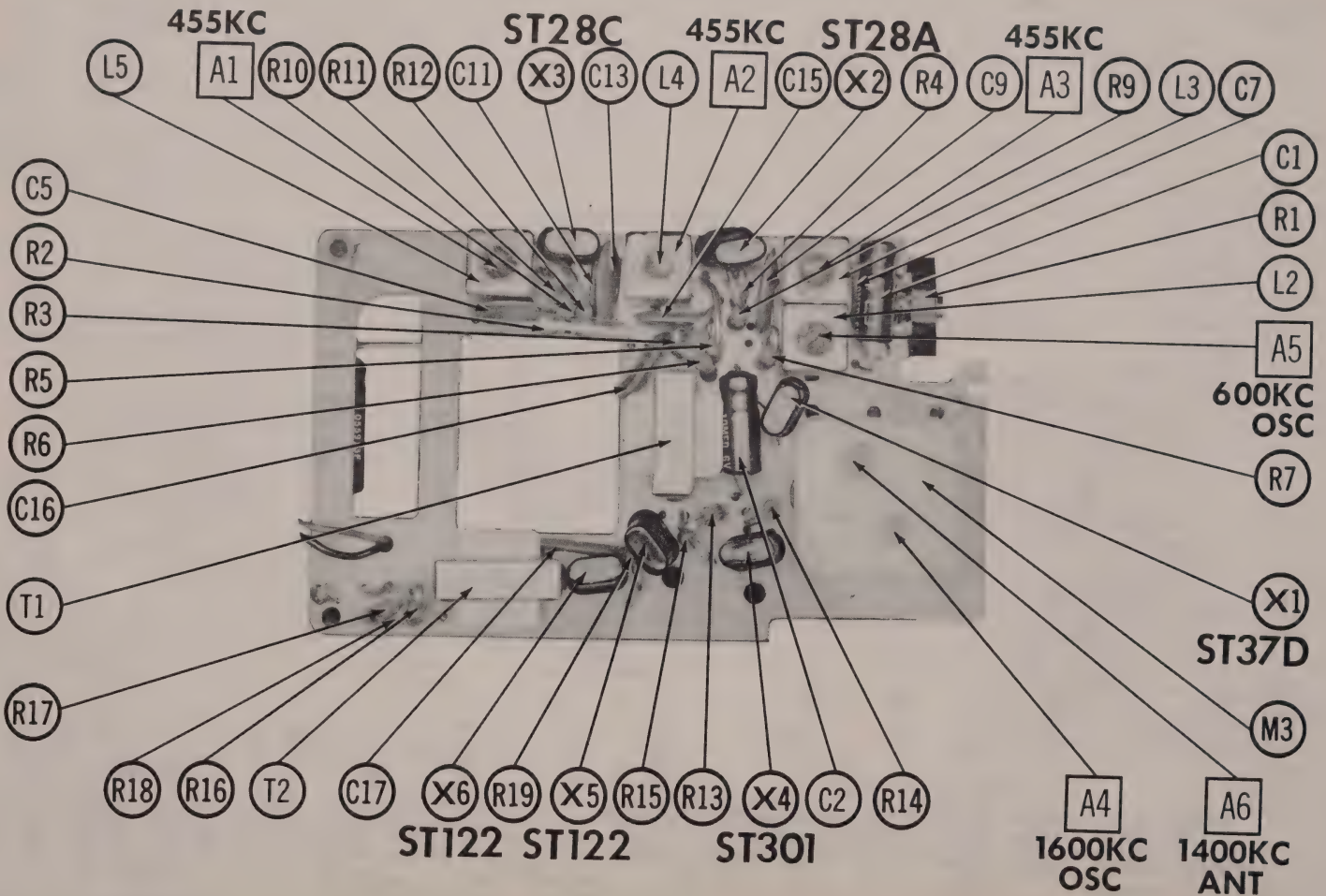
ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		ROBIN PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	SD-46		1N60	1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	ROBIN PART No.	NOTES
M3	Tuning Cap.		2 Gang.

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

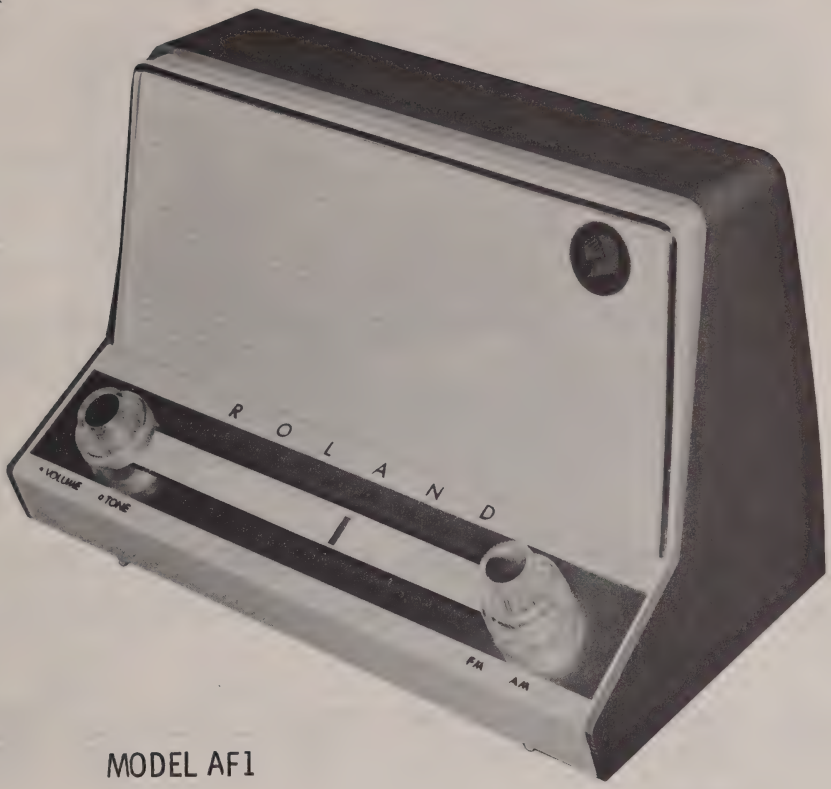


CHASSIS TOP VIEW

PHOTOFACT® Folder

**ROLAND MODELS
AF1 (71-581), 7A1**

ROLAND MODELS
AF1 (71-581), 7A1



MODEL AF1

ROLAND MODELS
AF1 (71-581), 7A1

TRADE NAME	Roland Model AF1 (71-581),7A1		
MANUFACTURER	Roland Radio Corp., 716 S. Columbus Ave., Mount Vernon, N. Y.		
TYPE SET	AC - DC Operated 7 Tube FM-AM Receiver		
POWER SUPPLY	105 - 120 Volts AC - DC	RATING	27 Watts, .27 Amp. @117 Volts AC
TUNING RANGE—BROADCAST	535 - 1650KC	FREQ. MOD.	88 - 108MC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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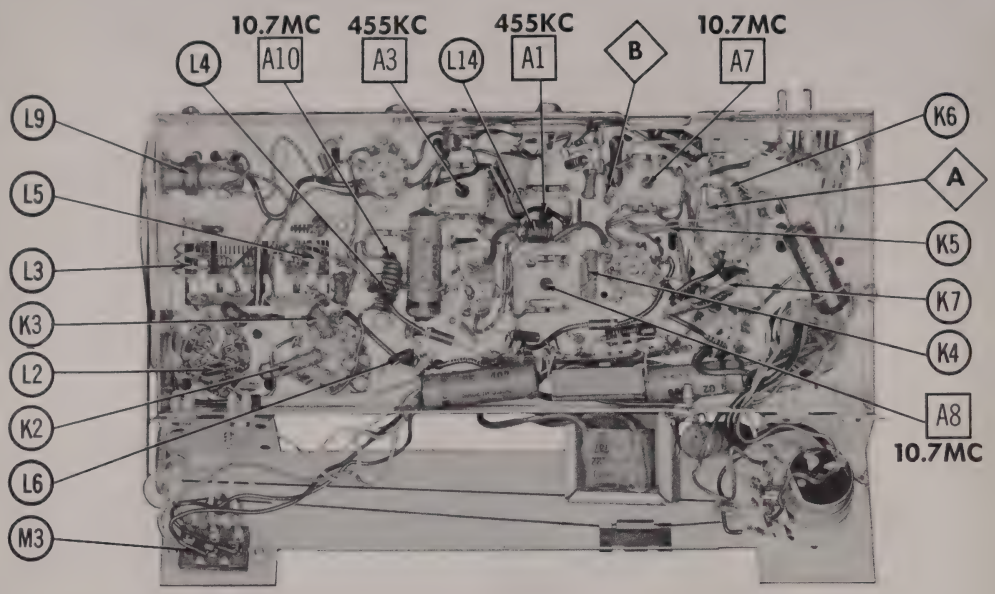
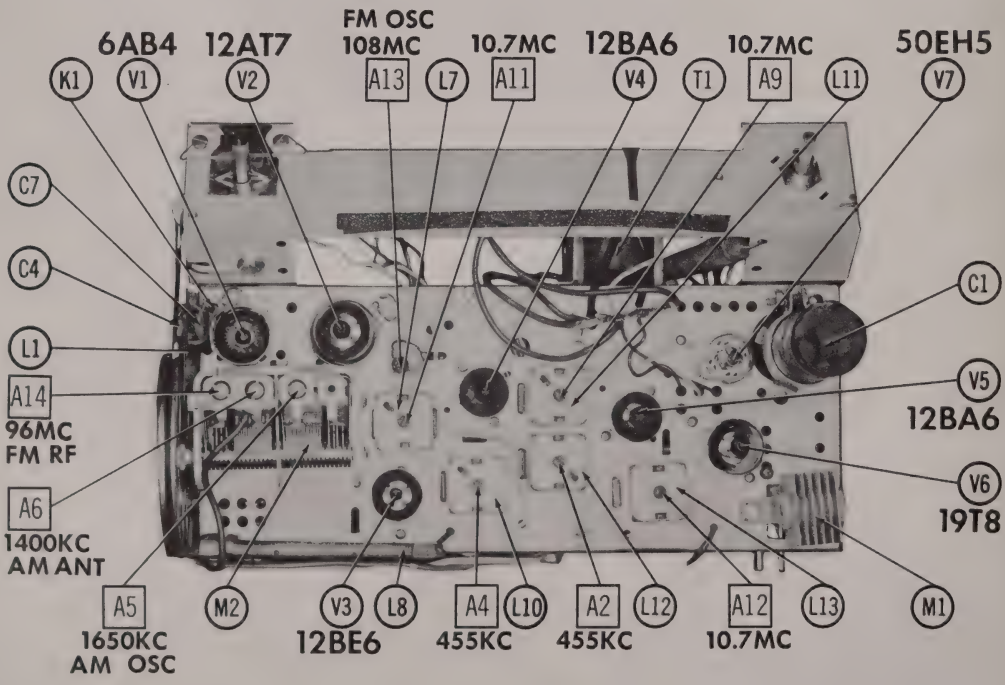
JK807



CHASSIS BOTTOM VIEW - INDUCTOR, ALIGNMENT & MISC. IDENT.



CHASSIS - TOP VIEW

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use only enough generator output to provide a usable indication.
Suggested alignment tools: A1 thru A4, A7 thru A12.... GENERAL CEMENT #5097, 8727
WALSCO #2515
A5, A6, A14..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

AM ALIGNMENT — SELECTOR IN AM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to pin 7 (grid) of AM Converter. Low side to chassis.	455KC (400∿ Mod.)	(AM) Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	Loop	1650KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	1400KC	Tune to 1400KC signal.	"	A6	Adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM — SELECTOR IN FM POSITION

Connect two matched 100K (±1%) resistors in series from point Ⓐ to chassis. The junction of these two resistors is alignment point Ⓒ as shown on the schematic.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	High side thru .01mfd to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	(FM) Point of non-interference.	DC probe to point Ⓐ. Common to chassis.	A7, A8, A9, A10, A11	Adjust for maximum deflection.
5.	"	"	"	DC probe to point Ⓑ. Common to point Ⓒ.	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE — SELECTOR IN FM POSITION

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	High side thru .01mfd to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (450KC Swp)	(FM) Point of non-interference.	Vert. amp to point Ⓐ. Low side to chassis.	A7, A8, A9, A10, A11	Disconnect Stabilizing Capacitor C2. Adjust for maximum gain and symmetry of response similar to Fig. 1. Reconnect C2.
5.	"	"	"	Vert. amp to point Ⓑ. Low side to chassis.	A12	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT — SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	Across FM antenna terminals with 270Ω in high side.	108MC (Unmod.)	(FM) 108MC	DC probe to point Ⓐ. Common to chassis.	A13	Adjust for maximum deflection.
7.	"	96MC	96MC	"	A14	"

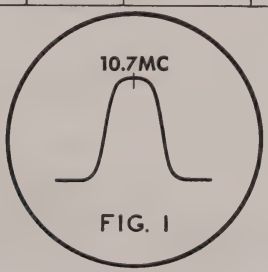


FIG. 1

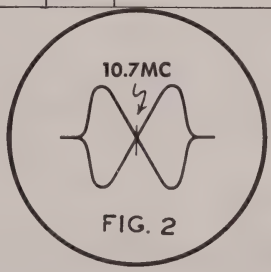
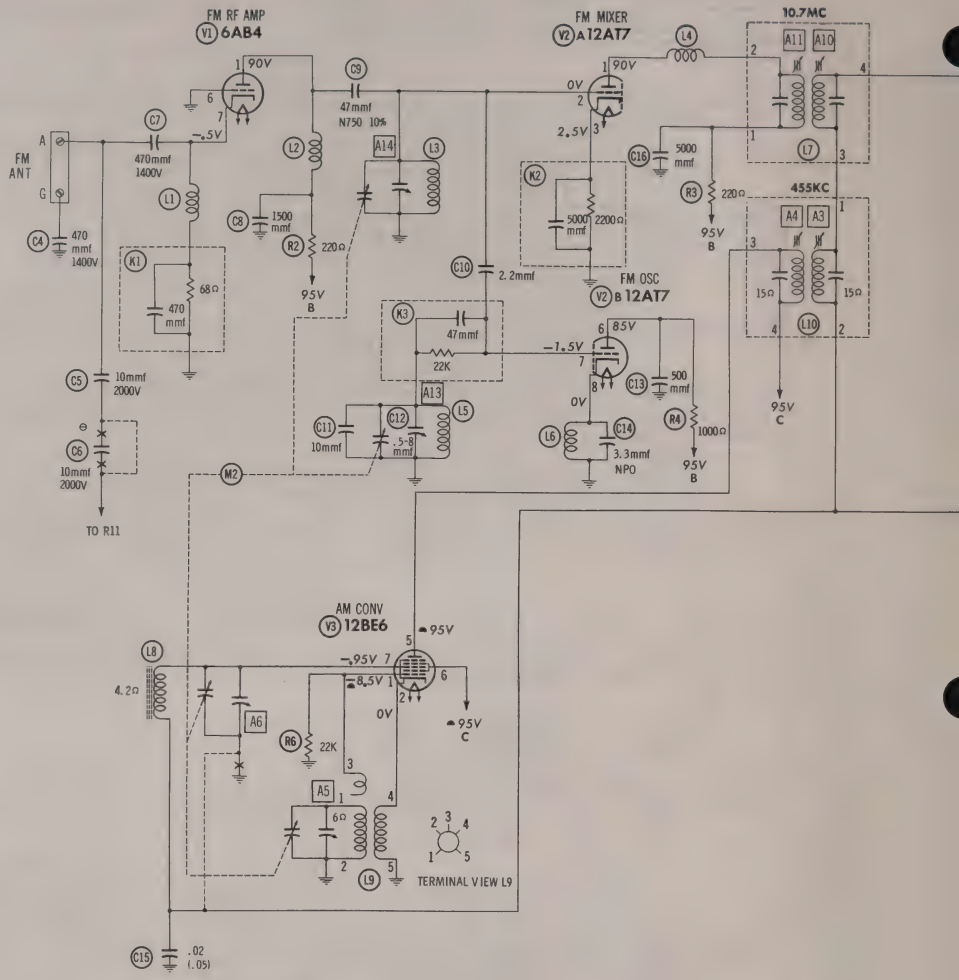


FIG. 2



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AB4	†970Ω	TP	67Ω	73Ω	TP	0Ω	68Ω		
V2	12AT7	†970Ω	.1Ω	2200Ω	67Ω	55Ω	†1800Ω	22K	.2Ω	61Ω
V3	12BE6	22K	.9Ω	55Ω	43Ω	†▬750Ω	†▬750Ω	▬3.2meg		
V4	12BA6	2.7meg ▬3.2meg	0Ω	43Ω	31Ω	†970Ω	†970Ω	0Ω		
V5	12BA6	470K	0Ω	31Ω	19Ω	†970Ω	†970Ω	0Ω		
V6	19T8	1meg	22K	1meg	19Ω	0Ω	0Ω	0Ω	6.8meg	†470K
V7	50EH5	68Ω	470K	120Ω	73Ω	470K	†750Ω	†220Ω		

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
▬ MEASURED IN "AM" POSITION.
† MEASURED FROM OUTPUT OF M1. TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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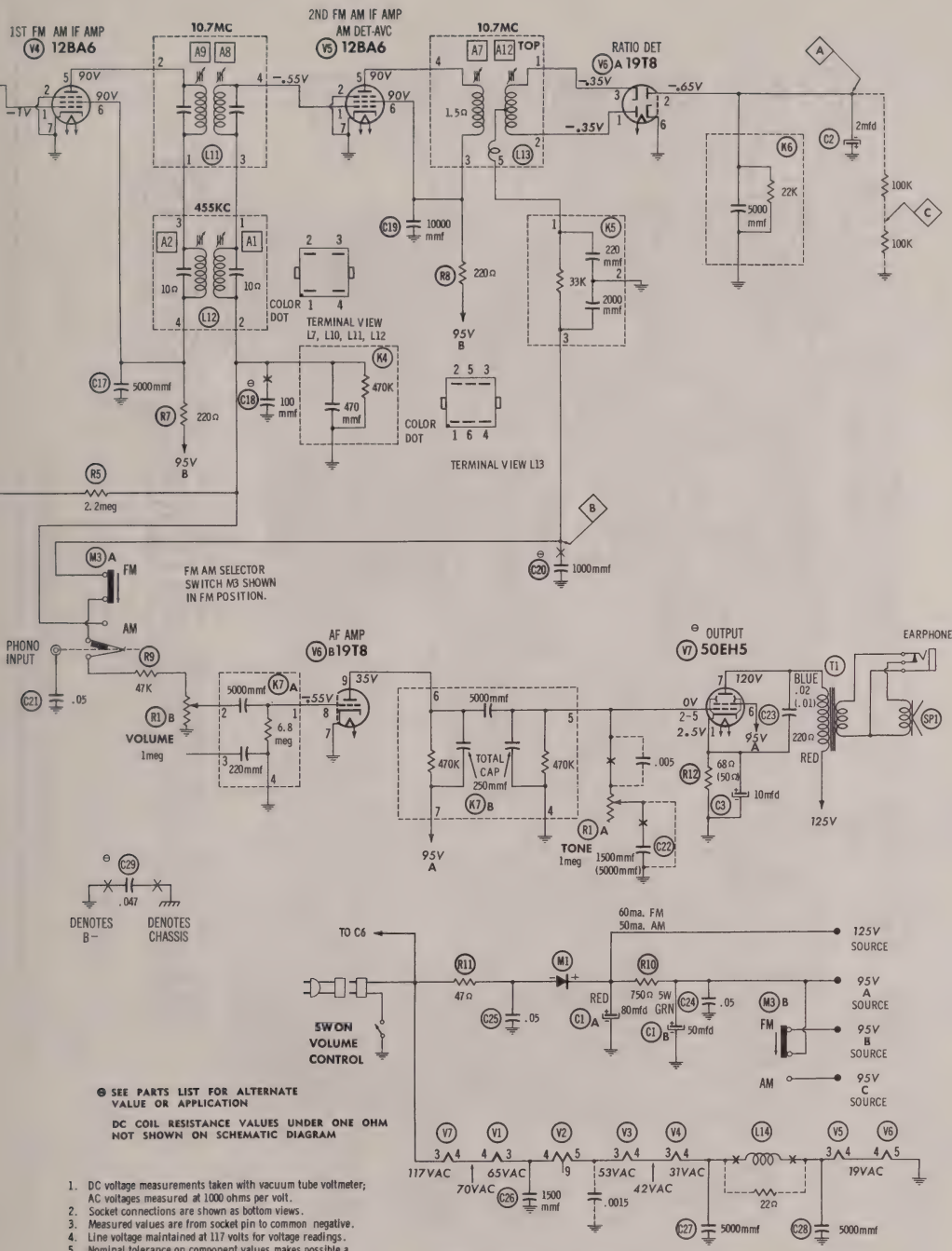


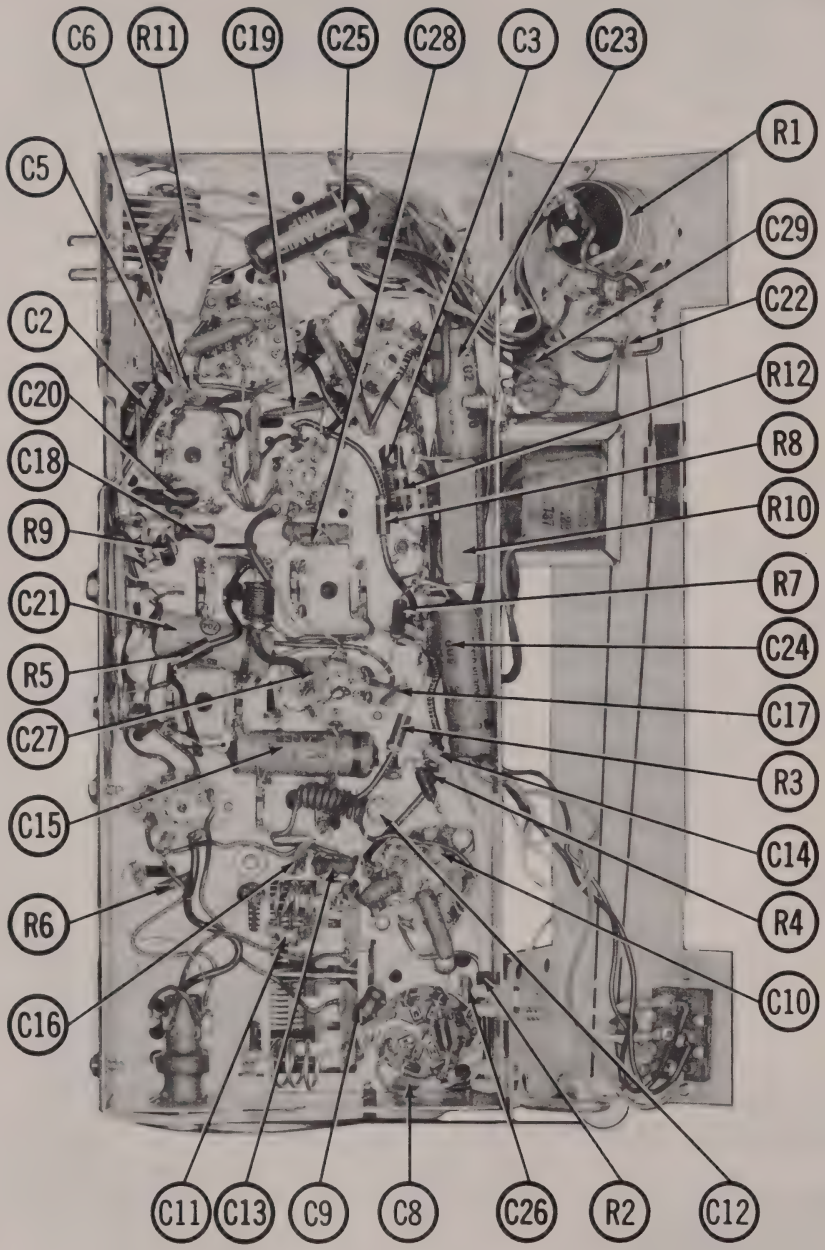
⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

ROLAND MODELS AF1 (71-581), 7A1



CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE (CBS / GENERAL ELECTRIC / RAYTHEON / SYLVANIA)
V1	FM RF Amplifier	6AB4
V2	FM Mixer-Osc.	12AT7
V3	AM Converter	12BE6
V4	1st FM AM IF Amplifier	12BA6
V5	2nd FM IF Amp. -AM Det. -AVC	12BA6
V6	Ratio Detector-AF Amp.	19T8
V7	Output	50EH5 (35C5) *

* Used in early versions.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	ROLAND PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	80	150	582004	PRS2240	BBRD8515	TCD498	TDLD-12	TVA-2462	
B	50	150							
C2	2	50	581036	PWE-50002	NLW2-50	TC302	ML2-50	TE-1301	
C3	10	10	581013	XPP-10010	NLW10-10	TT12X10	ML10-15	TE-1114	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	470 1400V		HVD-15-470	DD30-471	HVB20T47	3CCD-471	2HV-347	30GA-T47
C5	10 2000V		HVD-30-10	DD30-100	HVA20Q1	3CCD-100	2DY-410	30GA-Q10
C6	10 2000V	Note 1	HVD-30-10	DD30-100	HVA20Q1	3CCD-100	2DY-410	30QA-Q10
C7	470 1400V		HVD-15-470	DD30-470	HVB20T47	3CCD-471	2HV-347	30GA-T47
C8	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C9	47 N750 10%		N750-SI 47	TCN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C10	2, 2		NPO-SI 2, 2	TCZ-2R2	C10V22C	CCTO-2R2	CNO-522	10TCC-V22
C11	10 NPO		NPO-SI 10	TCZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C12	.5-8	#515049						
C13	500		SI 500	DD-501	BYA10T5	CCD-501	B-350	10TS-T50
C14	3.3 NPO		NPO-SI 3.3	TCZ-3R3	C10V33C	CCTO-3R3	CNO-533	10TCC-V33
C15	.02 400V	(.05) †	P488N-02	DD-203	CUB4S2	4DP-2-203	GEM-412	4TM-S2
C16	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C17	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C18	100	Note 1	SI 100	DD-101	L10T1	CCD-101	GP310	10TS-T10
C19	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C20	1000	Note 1	SI 1000	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C21	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C22	1500	(5000) †	BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C23	.02 400V	(.01) †	P488N-02	DD-203	CUB4S2	4DP-2-203	GEM-412	4TM-S2
C24	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C25	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C26	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C27	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C28	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C29	.047 400V	Note 1	P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47

Note 1. Not used in some versions.
\# Roland Part Number.
† Alternate Value.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	ROLAND PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1meg		368031	F1-52		† QJ-1264R	■	Tone
B	1meg			R2-52				Volume
C	Switch			KR-1				Power Off-On

† "Concentrikit" equivalent: K-15 Kit with base elements & shafts: (Not available as a factory assembled unit) B13-137, P14-016 (Panel); B13-137, R1-028 (Rear); 76-1 (Switch)

■ "STA-LOC" equivalent: FA16A, RU16A, OS500, IS937, US41.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	220Ω	
R3	220Ω	
R4	1000Ω	
R5	2.2meg	
R6	22K	
R7	220Ω	
R8	220Ω	
R9	47K	
R10	750Ω 5W	
R11	47Ω	
R12	68Ω	(50Ω) *

* Alternate Value.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ROLAND PART No.	REPLACEMENT DATA
K1	FM RF Amp. Cath.	470mmf, 68Ω	420013	
K2	FM Mixer Cath.	5000mmf, 2200Ω	420016	
K3	FM Osc. Grid	47mmf, 22K	420019	
K4	AM Det. RF Filter	470mmf, 470K	420014	Centralab RC465 Sprague PCR-3
K5	FM De-Emphasis Net	220mmf, 2000mmf, 33K	420012	
K6	FM Stabilizing Net	5000mmf, 22K	420015	
K7	Audio Coupling	220mmf, 250mmf, 5000mmf, 5000mmf, 470K, 470K, 6.8meg	420006	Aerovox PA-113-2 Centralab PC-151 Cornell-Dubilier 116TM2 Mallory MS-107 Sprague DT-2

COILS (RF-IF)

ITEM No.	USE	ROLAND PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Cathode Choke	455077	19-1001	19-1001	BC-562	4604		1.7uh
L2	RF Choke	455077	19-1001	19-1001	BC-562	4604		1.7uh
L3	FM RF Coil	455079						
L4	RF Choke		19-1000	19-1000	BC-561	4602		1uh
L5	FM Osc. Coil	455078						
L6	Cathode Choke	455077	19-1001	19-1001	BC-562	4604		1.7uh
L7	1st FM IF Trans.	450005	16-3487	16-3487	FM-254	1463		
L8	Loopstick	464030			BC-419			
L9	AM Osc. Coil	455080	14-1073	14-1073	BC-393	69-OSC		
L10	1st AM IF Trans.	450023	16-6758	16-6758	BC-352	12-C1	RF-1	
L11	2nd FM IF Trans.	450005	16-3487	16-3487	FM-254	1463		
L12	2nd AM IF Trans.	450013	16-6758	16-6758	BC-353	12-C2	RF-2	
L13	Ratio Det.	450006	17-3498	17-3498	FM-255	1465		
L14	Fil. Choke		19-1001	19-1001	BC-562	4604		1.5uh

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	ROLAND PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2600Ω	3-4Ω	430330	24S53	A-3025	AU-605	A-3332	24S53	S-12X	

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	ROLAND PART No.	QUAM PART No.	NOTES
SP1	5"	PM	3-4Ω	405005	5A2	

FOLDER 15

ROLAND MODELS
AF1 (71-581), 7A1

PARTS LIST AND DESCRIPTIONS (Continued)

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					
	CURRENT (Measured)	ROLAND PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.060A	380018 ♦	T100 ♦	1235AH ♦	100A ♦	SR200 *	♦ Selenium Type * Silicon Type

MISCELLANEOUS

ITEM No.	PART NAME	ROLAND PART No.	NOTES
M2	Tuning Cap	590053	FM AM, 4 Gang (Ant. 17-290mmf, Osc. 29-170mmf)
M3	Switch	370050	FM-AM Selector (DPDT Slide Type)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

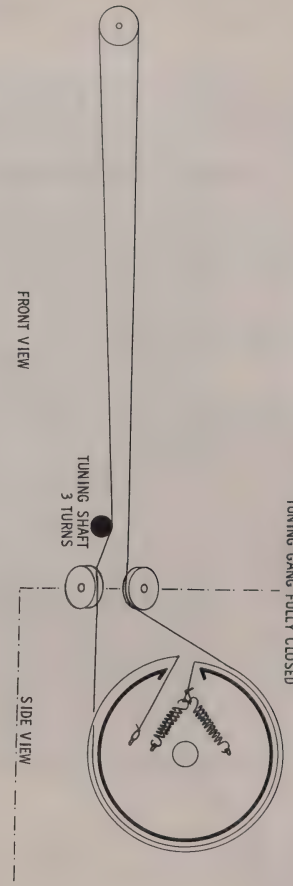
NAME	PART NO.	DESCRIPTION
Knob	272297	Tuning (Outer)
Knob	272296	Volume (Outer)
Knob	272295	Tone (Inner)
Knob	272270	FM-AM (Inner)
Cabinet Front	250383	
Cabinet Rear	250295	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord (Interlock Type) ..... Use BELDEN No. 8874

DIAL CORD STRINGING



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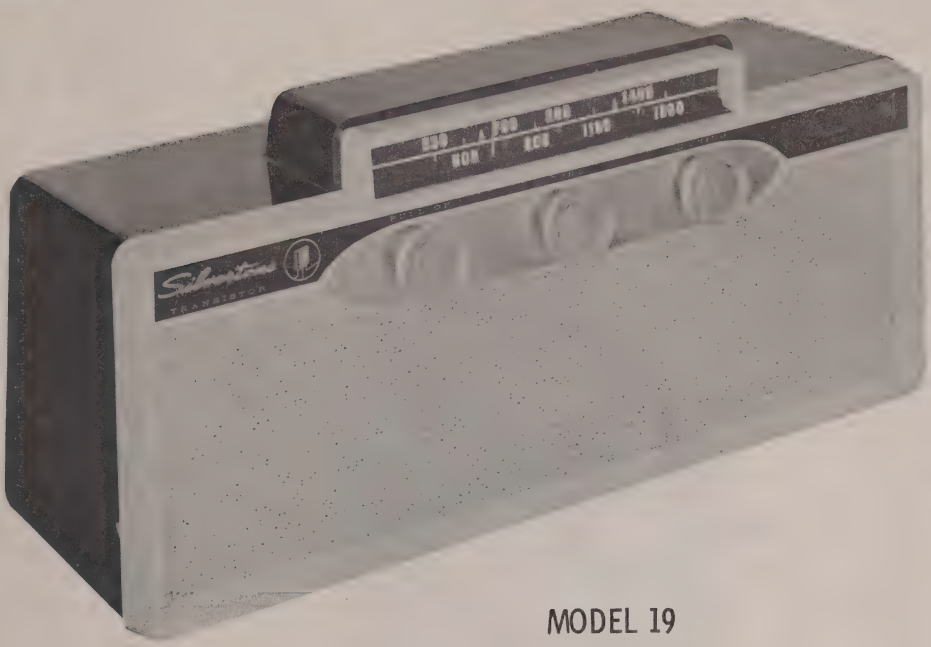
SILVERTONE MODELS 19, 20, 21, 22 (Ch. 132.45701)

SILVERTONE MODELS 19, 20, 21, 22 (Ch. 132.45701)



MODEL 19

SILVERTONE MODELS 19, 20, 21, 22 (Ch. 132.45701)

TRADE NAME	Silvertone Models 19, 20, 21, 22 (Ch. 132.45701)		
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois		
TYPE SET	Battery Operated Transistorized Portable AM Receiver		
POWER SUPPLY	9 Volts DC	RATING	8MA @ 9 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	540 — 1670KC		20 MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:

A1 thru A4.... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8729, 8987, 8988, 8989
WALSCO #2515, 2531, 2532

A5, A6..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

A7..... GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	1670KC	"	"	A5	"
3.	"	1400KC	Tune to 1400KC Signal.	"	A6	
4.	"	600KC	Tune to 600KC Signal.	"	A7	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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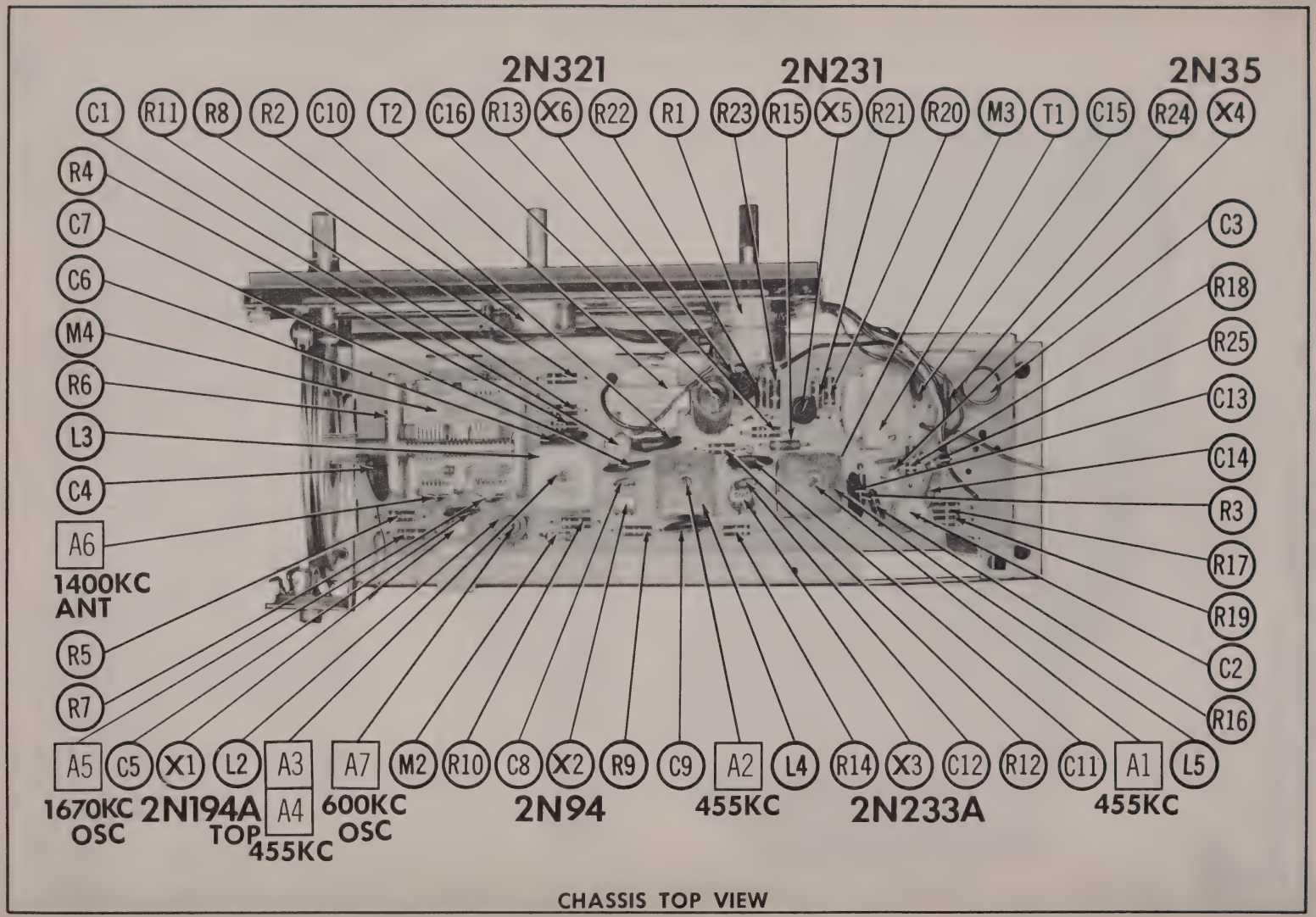
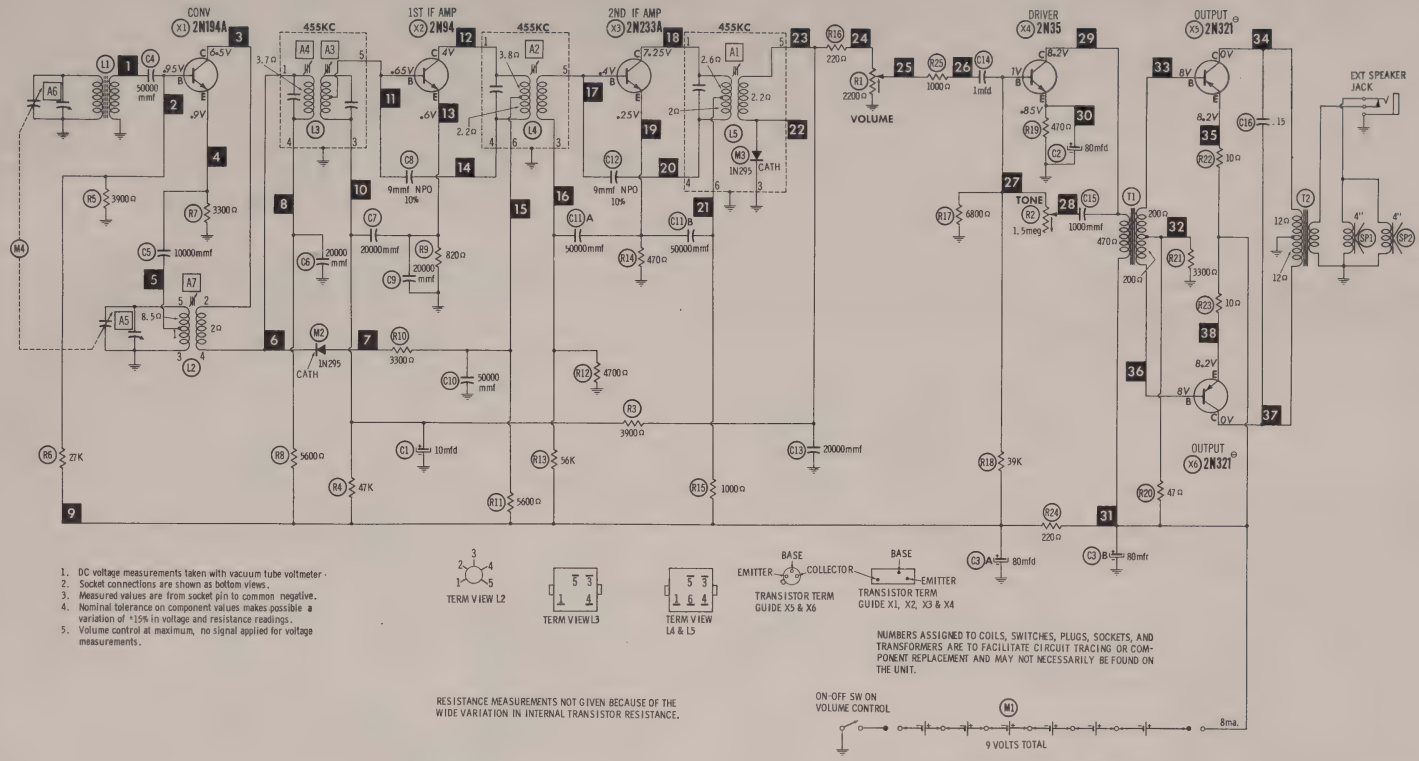
JG762

SET 494 FOLDER 16



CHASSIS TOP VIEW



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

TERM VIEW L2

TERM VIEW L3

TERM VIEW L4 & L5

TRANSISTOR TERM GUIDE X5 & X6

TRANSISTOR TERM GUIDE X1, X2, X3 & X4

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

ON-OFF SW ON VOLUME CONTROL

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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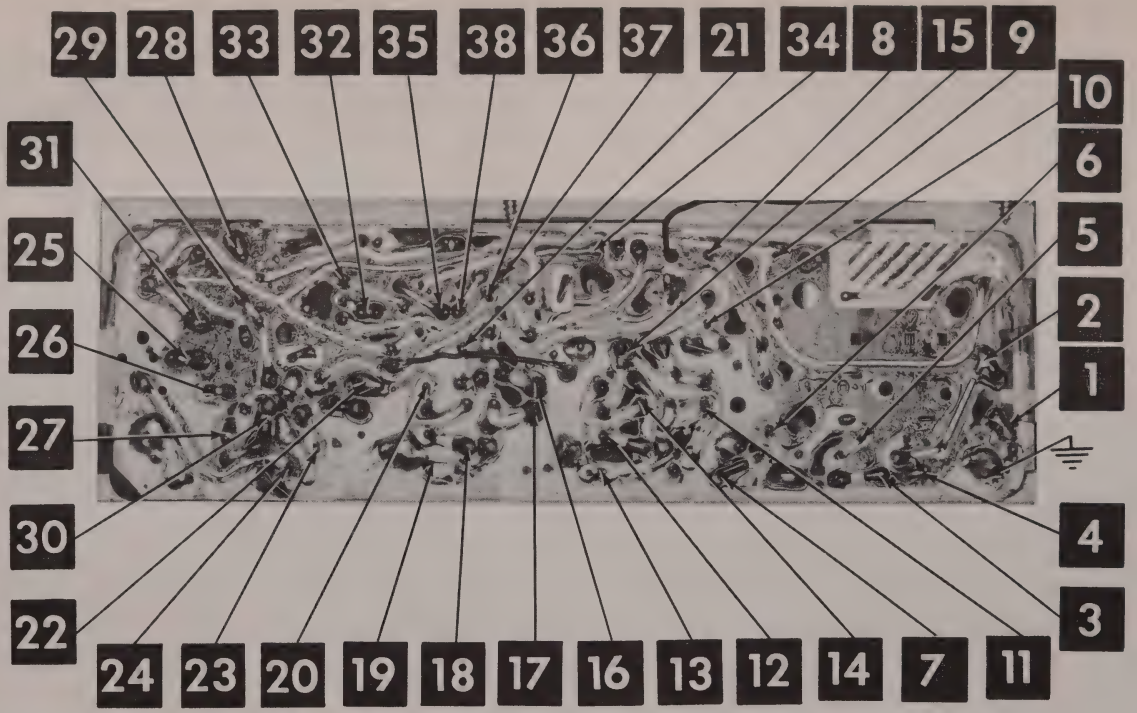
SILVERTONE MODELS 19, 20, 21, 22 (Ch. 132.45701)



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PRINTED BOARD

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N194A	Converter	2N438		2N1366	2N94A	NPN
X2	2N94	1st IF Amplifier	2N438		2N1367	2N94	NPN
X3	2N233A	2nd IF Amplifier	2N438		2N1367	2N233A	NPN
X4	2N35	Driver	2N438	2N649		2N35	NPN
X5	2N321 *	Output		2N270	2N360	2N321	PNP) Matched
X6	2N321 *	Output		2N270	2N360	2N321	PNP) Pair

* Some versions may use 2N270 in this application.

ELECTROLYTIC CAPACITORS

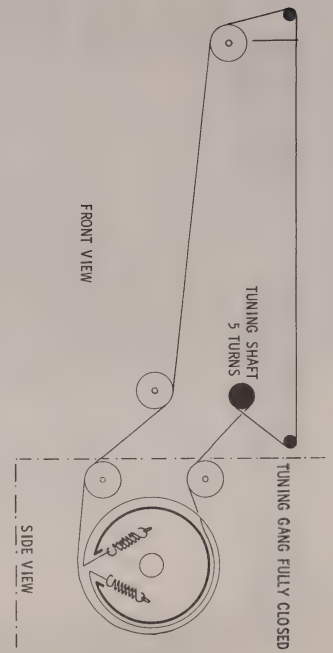
ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	10	10	44396-4	PWE10010	EC10-10	TT12X10	ML10-15	TE-1114	
C2	80	10	44396-5	PWE10100	EC100-10	TT15X100	ML100-15	TE-1134	
C3A	80	10	) 44397-3	BCD10X8080	ECPAN7	TT15X100		VL-2350	
B	80	10	)			TT15X100			

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C6	20000		BPD-02	DD-203	BYB6S2	CCD-203	GP120	5HK-S20
C7	20000		BPD-02	DD-203	BYB6S2	CCD-203	GP120	5HK-S20
C8	9 NPO 10%		NPO-DI 10	DTZ-10	C10V9C	CCTO-100	CNO-410	10TCC-Q10
C9	20000		BPD-02	DD-203	BYB6S2	CCD-203	GP120	5HK-S20
C10	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C11A	50000	)	BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
B	50000	)	BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C12	9 NPO 10%		NPO-DI 10	DTZ-10	C10V9C	CCTO-100	CNO-410	10TCC-Q10
C13	20000		BPD-02	DD-203	BYB6S2	CCD-203	GP120	5HK-S20
C14	1mfd 3V	#44684-9		UK-105				
C15	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C16	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15

\# Silvertone Part Number.



DIAL CORD STRINGING

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	2200Ω	½	44500-8					Volume
B	Switch							Push-Pull Off-On
R2A	1.5meg	½	44500-9	B-76	A47-2meg-Z	B13-138	U55	Tone
B	Shaft			Not Req.	FS-3	SK-1	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	3900Ω	
R4	47K	
R5	3900Ω	
R6	27K	
R7	3300Ω	
R8	5600Ω	
R9	820Ω	
R10	3300Ω	

ITEM No.	RATING	REMARKS
R11	5600Ω	
R12	4700Ω	
R13	56K	
R14	470Ω	
R15	1000Ω	
R16	220Ω	
R17	6800Ω	
R18	39K	

ITEM No.	RATING	REMARKS
R19	470Ω	
R20	47Ω	
R21	3300Ω	
R22	10Ω	
R23	10Ω	
R24	220Ω	
R25	1000Ω	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		SILVERTONE PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	45534-10	14-9009	14-9009				
L2	Osc. Coil	45783-3						
L3	1st IF Trans.	44674						
L4	2nd IF Trans.	45900-12						
L5	3rd IF Trans.	45900-13						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	.9	1	44672						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	120Ω	3-4Ω	44671-3	TR-111			TA-39①	TR-111		

① Bend mounting tabs down. Use 4Ω tap on secondary.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SILVERTONE PART No.	QUAM PART No.	
SP1	4"	PM	6-8Ω	45916	4A07Z6.3	
SP2	4"	PM	6-8Ω	45916	4A07Z6.3	

BATTERIES

ITEM No.	VOLTAGE	SILVERTONE PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	6445 *		230 *		A100 *		M-13R *	* 6 Required

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		SILVERTONE PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N295		1N636	1N295	1N295	Overload (Pigtail)
M3	1N295		1N636	1N295	1N295	Detector (Part of L5)

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M4	Tuning Cap.	45039-2	2 Gang

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	47217-1	Tuning, Volume
Pointer	47219-1	
Cabinet Front	47778-67	Ivory
Cabinet Back	45765-482	Model 19
Cabinet Back	47222-107	Model 20
Cabinet Back	45765-832	Model 21
Cabinet Back	45765-952	Model 22

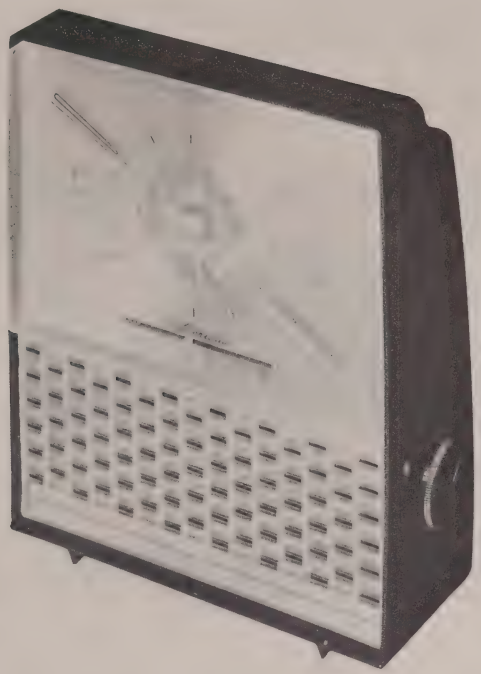
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

PHOTOFACT® Folder with CIRCUITRACE®

SILVERTONE MODEL 47
(Ch. 528.53710, 711, 712)

SILVERTONE MODEL 47
(Ch. 528.53710, 711, 712)



TRADE NAME	Silvertone Model 47 (Ch. 528.53710, 528.53711, 528.53712)		
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois		
TYPE SET	Battery Operated Transistorized AM Receiver With Clock		
POWER SUPPLY	6 Volts DC (Radio), 1.5 Volts DC (Clock)	RATING	11 MA@6 Volts DC (No signal, Min. Volume)
TUNING RANGE—BROADCAST	532 – 1610KC		20 MA@6 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools: A1, A2, A3...GENERAL CEMENT #9440
A4, A6.....GENERAL CEMENT #5000, 5003, 5014, 5015, 5016, 8276, 8290
WALSCO #2512, 2515, 2522, 2523, 2525, 2537
A5.....GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to base of Converter. Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Adjust for maximum output.
2.	"	1610KC	"	"	A4	"
3.	"	532KC	Tuning gang fully closed.	"	A5	"
4.	Loop	1400KC	Tune to 1400KC Signal.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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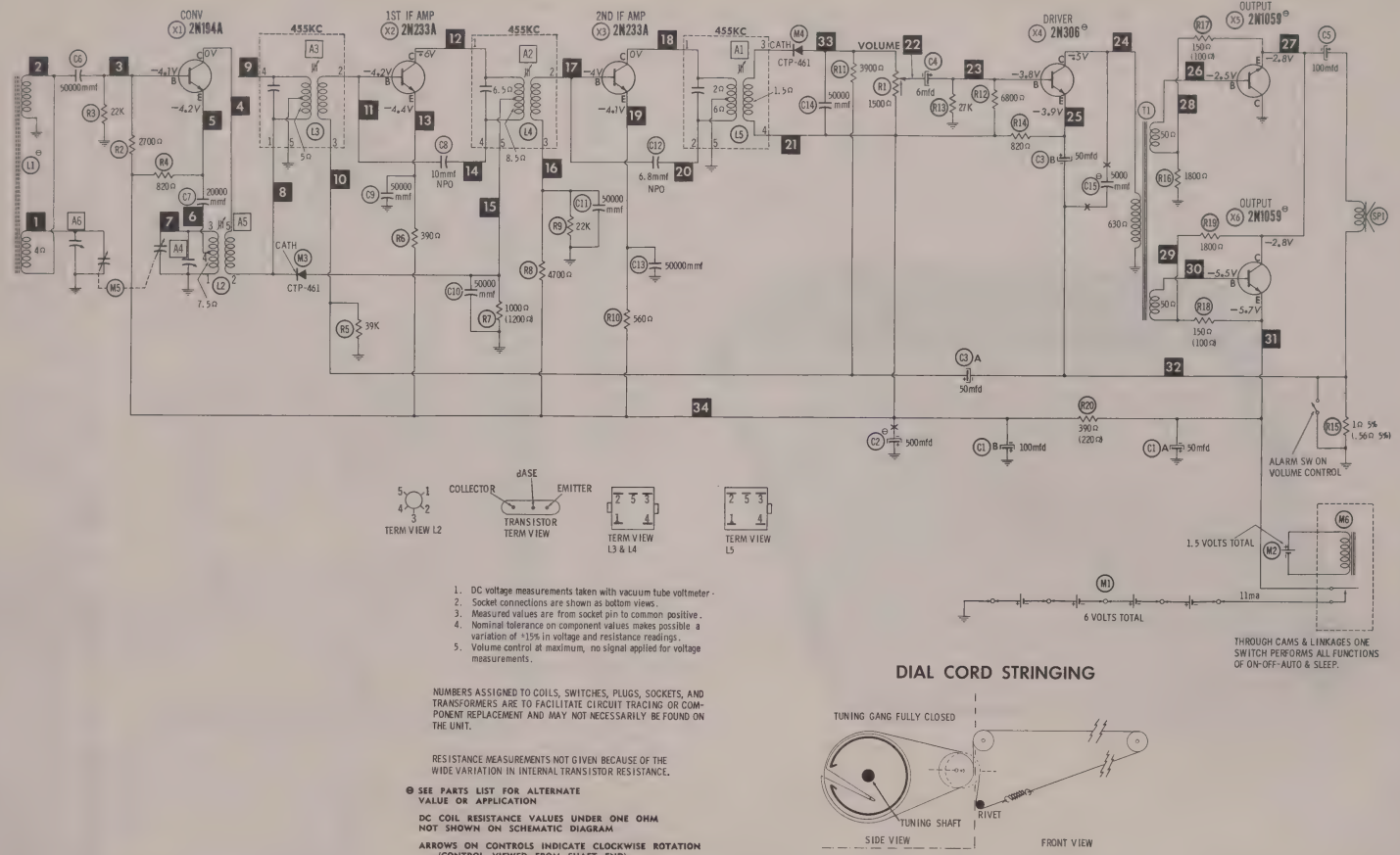
JG821

SET 494 FOLDER 17



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common positive.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

⊖ **SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION**

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

DIAL CORD STRINGING

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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SILVERTONE MODEL 47
(Ch. 528.53710, 711, 712)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N194A	Converter	2N438		2N1366	2N194A	NPN
X2	2N233A	1st IF Amplifier	2N438		2N1367	2N233A	NPN
X3	2N233A	2nd IF Amplifier	2N438		2N1367	2N233A	NPN
X4	2N306 *	Driver	2N306	2N649		2N306	NPN
X5	2N1059 ♦	Output	2N444	2N649		2N1059	NPN ⎫ Matched
X6	2N1059 ♦	Output	2N444	2N649		2N1059	NPN ⎭ Pair

* Chassis 528, 53712 uses 2N1251 in this application.
♦ Chassis 528, 53712 uses 2N1101 in this application (Matched Pair).

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	50	6	18-101-5	BCD6X10030	ECPAP6			VLS-2151	
B	100	6							
C2	500	15	18-103-5①						
C3A	50	10	18-96-5	BCD10X5050	ECPAP5	PET2365C		VLPS-2251 *	
B	50	10							
C4	6	15	18-84-5	XPP-15006	EC6-25	TT25X6	ML6-15	TE-1153	
C5	100	15	18-99-5	SRE15V100	NLW100-15	TT15X100	ML100-15	TE-1162	

① Not used in some versions.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C7	20000		BPD-02	DD-203	BYB6S2	CCD-203	GP120	5HK-S20
C8	10 NPO		NPO-DI 10	DTZ-10	C10QIC	CCTO-100	CNO-410	10TCC-Q10
C9	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C10	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C11	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C12	6.8 NPO		NPO-DI 6.8	DTZ-6R8	C10V68C	CCTO-6R8	CNO-568	10TCC-V68
C13	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C14	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C15	5000	Note 1	BPD-005	DD-502	BYA10D5	CCD-502	GP250	5HK-D50

Note 1. Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	1500Ω	1/4	24-361-0					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	2700Ω	
R3	22K	
R4	820Ω	
R5	39K	
R6	390Ω	
R7	1000Ω	(1200Ω) *
R8	4700Ω	

ITEM No.	RATING	REMARKS
R9	22K	
R10	560Ω	
R11	3900Ω	
R12	6800Ω	
R13	27K	
R14	820Ω	
R15	1Ω 5%	(.56Ω 5%) *

ITEM No.	RATING	REMARKS
R16	1800Ω	
R17	150Ω	(100Ω) *
R18	150Ω	(100Ω) *
R19	1800Ω	
R20	390Ω	(220Ω) *

* Alternate Value.

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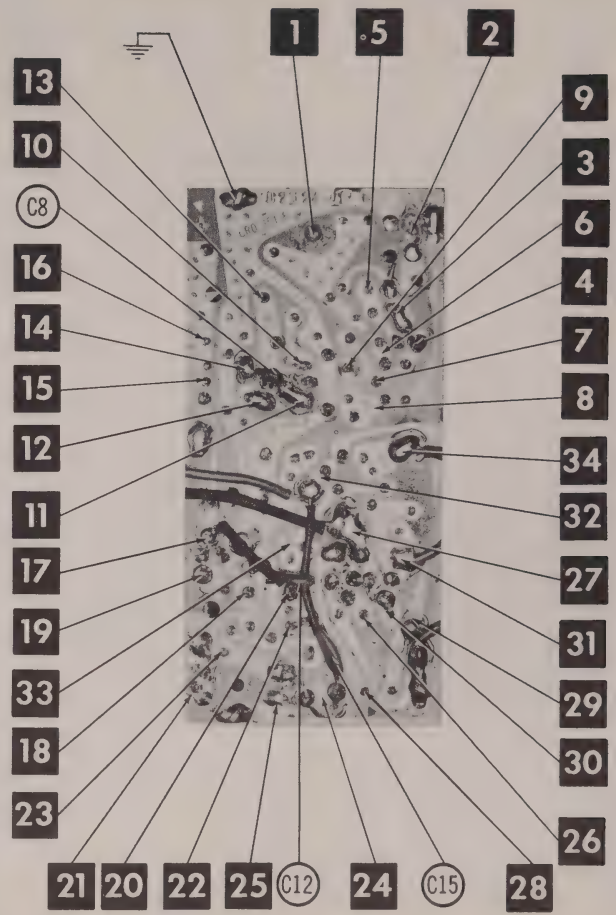
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		SILVERTONE PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	82-156-0①						
L2	Osc. Coil	10-57-4						
L3	1st IF Trans.	10-120-2						
L4	2nd IF Trans.	10-121-2						
L5	3rd IF Trans.	10-122-2						

① Part #82-163-0 used in Chassis 528.53711, 528.53712.

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.5	1 SEC. 2 1	80-108-1						

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SILVERTONE PART No.	QUAM PART No.	
SP1	3"	PM	32-34Ω	33-424-4		

BATTERIES

ITEM No.	VOLTAGE	SILVERTONE PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	6447 *		930 *		1015 *		M-15R *	* 4 Required, Radio
M2	1.5V	6446 ♦		130♦		635 ♦		M-14R ♦	♦ 1 Required, Clock

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		SILVERTONE PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M3	CTP-461		1N295	1N295	1N295	AVC, Overload (Pigtail)
M4	CTP-461		1N295	1N295	1N295	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M5	Tuning Cap.	19-86-2	2 Gang
M6	Timer	59-152	

CABINETS & CABINET PARTS

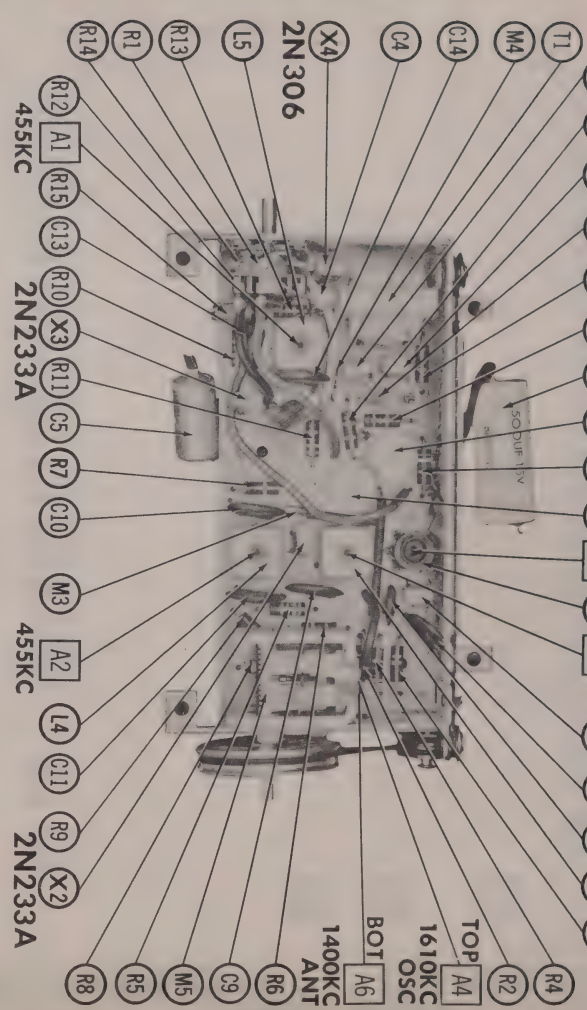
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	52-1282-0	Tuning
Knob	52-1283-0	Volume
Knob	52-1286-0	Timer (2 Used)
Pointer	52-218-1	

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT® Folder with CIRCUITRACE®

WESTINGHOUSE MODELS H-M1500, H-M1501, H-M1502, H-M1503 (Ch. V-2510-3, V-2511-2)

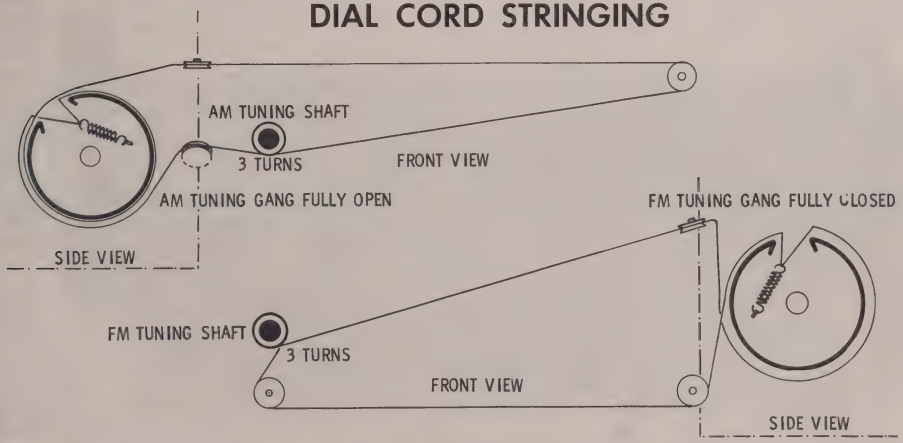
WESTINGHOUSE MODELS H-M1500, H-M1501, H-M1502, H-M1503 (Ch. V-2510-3, V-2511-2)

MODEL H-M1501

TRADE NAME	Westinghouse Models H-M1500, H-M1501, H-M1502, H-M1503 (Tuner Ch. V-2511-2, Amp Ch. V-2510-3)
MANUFACTURER	Westinghouse Electric Corp., Radio-Television Div., Metuchen, N. J.
TYPE SET	AC Operated 9 Tube FM-AM Tuner With Stereo Preamplifier, 7 Tube Stereo Amplifier and 4 Speed Automatic Record Changer
POWER SUPPLY	110 - 120 Volts AC, 60 Cycles RATING 140 Watts, 1.3 Amp. @117 Volts AC (Radio)
TUNING RANGE—BROADCAST	535 — 1620KC FREQ. MOD: 88 — 108MC

FOR SERVICE INFORMATION ON RECORD CHANGER PART #670V010H04 — SEE V-M 1201 — PHOTOFACT SET 436 FOLDER 18 OR RECORD CHANGER MANUAL RC-12

DIAL CORD STRINGING



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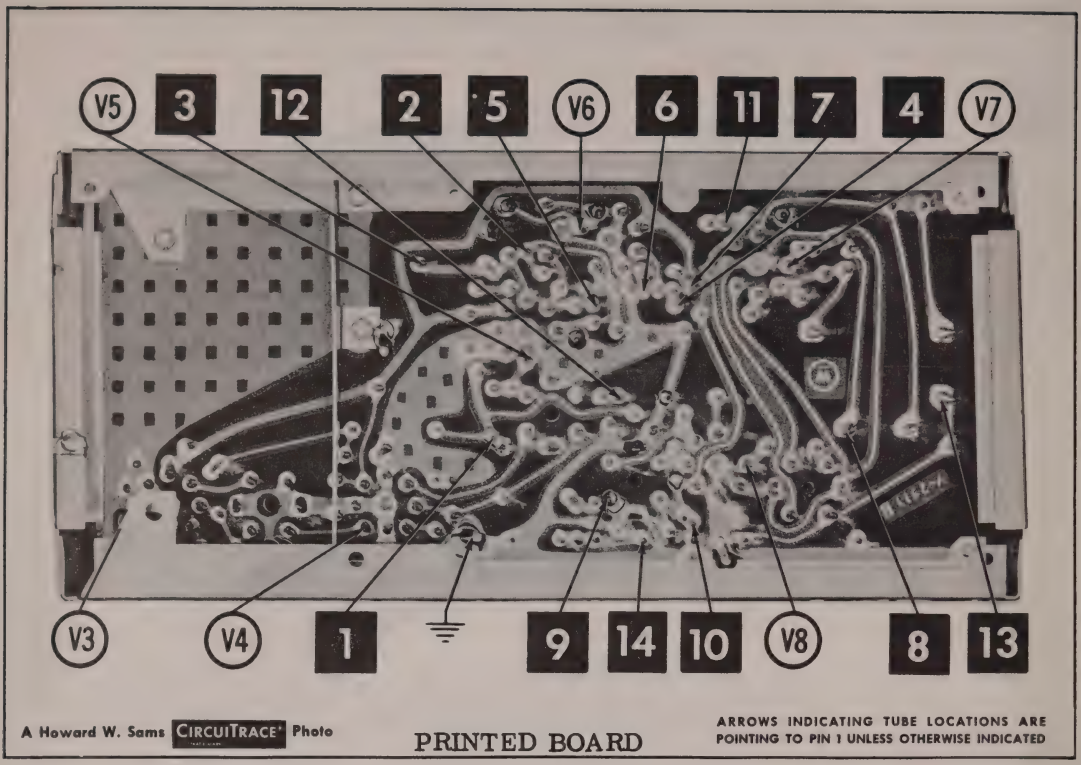
KN060

SET 494 FOLDER 18



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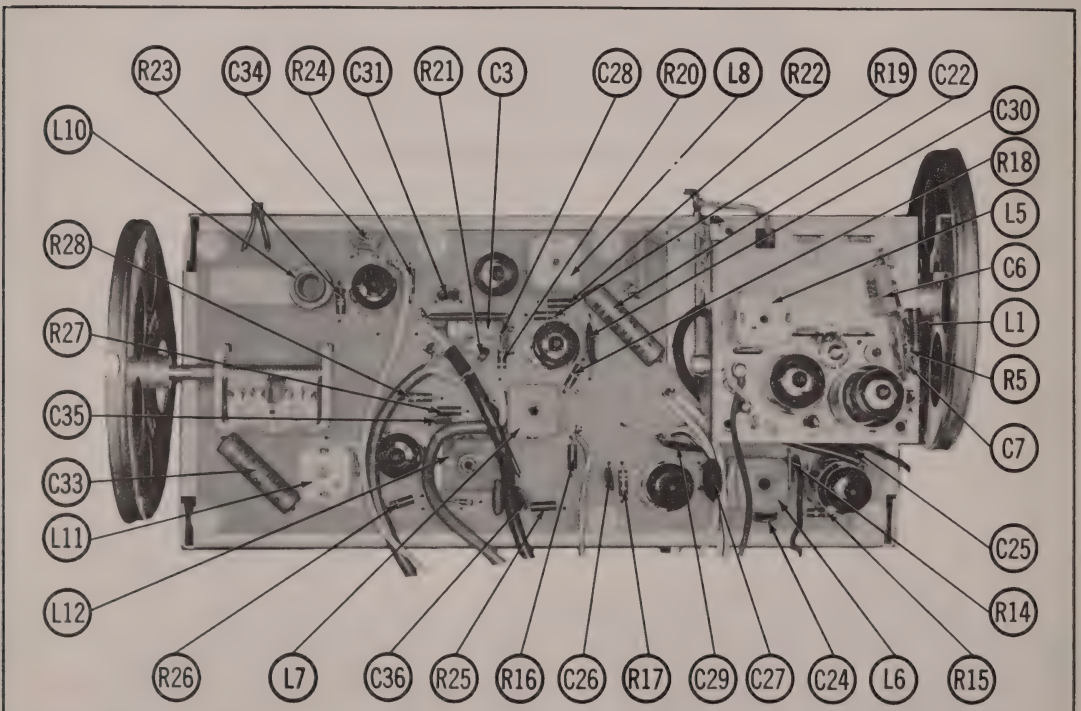
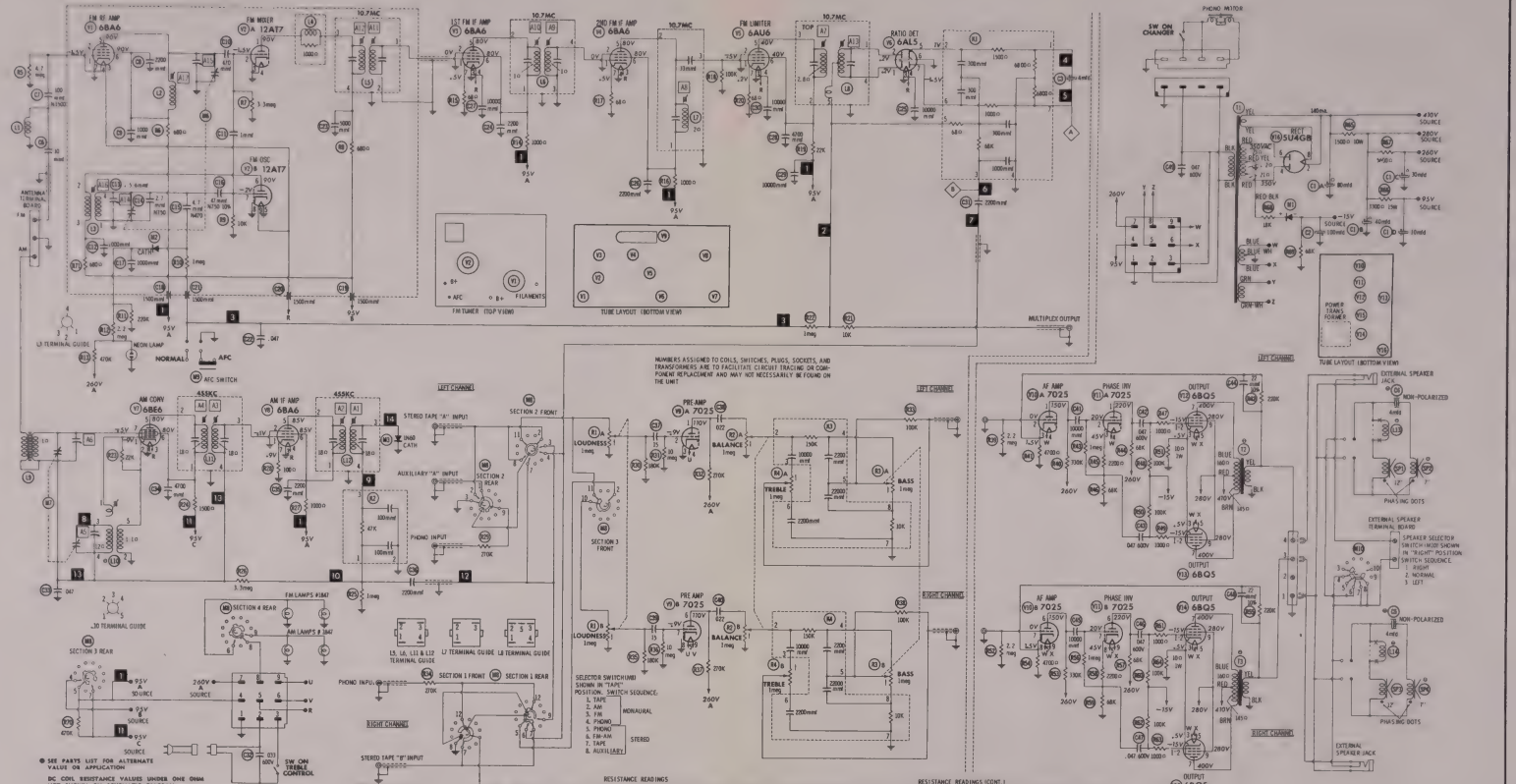
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



TUNER CHASSIS—TOP VIEW—CAPACITOR, RESISTOR & INDUCTOR IDENT.



● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BA6	4.1meg	0Ω	0Ω	.6Ω	†500Ω	†500Ω	0Ω		
V2	12AT7	†560Ω	3.3meg	0Ω	0Ω	0Ω	†500Ω	30K	0Ω	.6Ω
V3	6BA6	.1Ω	0Ω	0Ω	.6Ω	†580Ω	†580Ω	68Ω		
V4	6BA6	1Ω	0Ω	.6Ω	0Ω	†580Ω	†580Ω	68Ω		
V5	6AU6	100K	0Ω	0Ω	.6Ω	†27K	†27K	68Ω		
V6	6AL5	INF	INF	0Ω	.6Ω	8000Ω	0Ω	1800Ω		
V7	6BA6	22K	1.1Ω	.6Ω	0Ω	†,6300Ω	†,6300Ω	4.3meg		
V8	6BA6	4.3meg	0Ω	0Ω	.6Ω	†,5800Ω	†,5800Ω	100Ω		
V9	7025	†275K	10meg	0Ω	.1Ω	.1Ω	†275K	10meg	0Ω	.1Ω
V10	7025	†335K	2.2meg	470Ω	.1Ω	.1Ω	†330K	2.2meg	470Ω	.1Ω

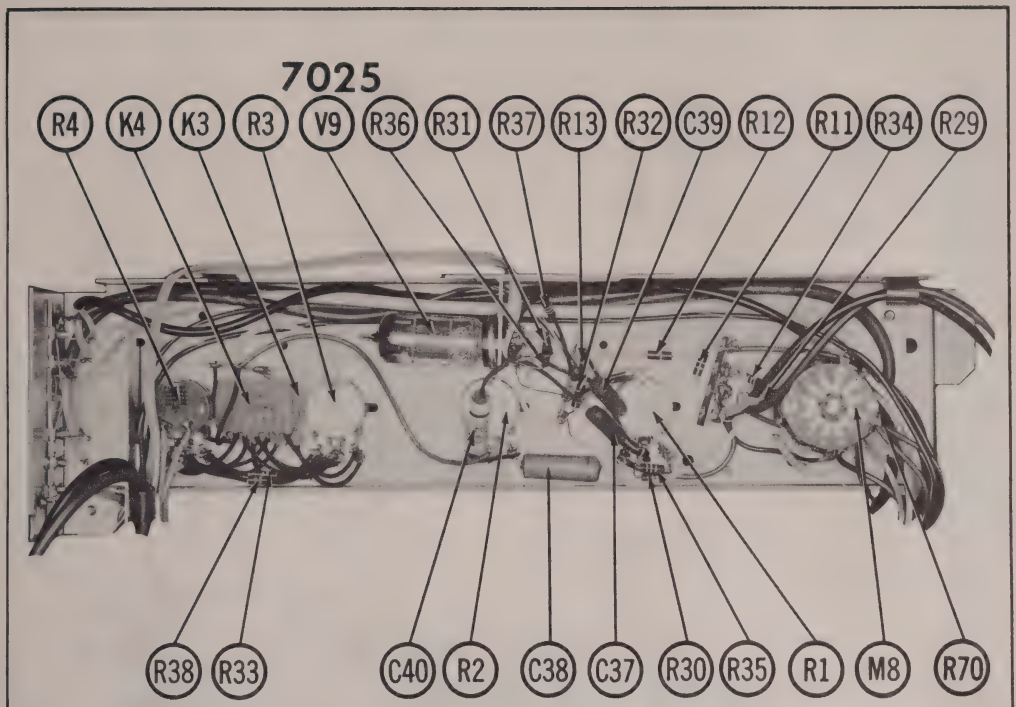
RESISTANCE READINGS (CONT.)

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V11	7025	†75K	1meg	70K	1Ω	.1Ω	†75K	1meg	70K	1Ω
V12	6BQ5	170K	170K	10Ω	.1Ω	.1Ω	NC	†160Ω	NC	†250Ω
V13	6BQ5	170K	170K	10Ω	.1Ω	.1Ω	NC	†145Ω	NC	†250Ω
V14	6BQ5	170K	170K	10Ω	.1Ω	.1Ω	NC	†160Ω	NC	†250Ω
V15	6BQ5	170K	170K	10Ω	.1Ω	1Ω	NC	†145Ω	NC	†250Ω
V16	5U4GB	NC	1	NC	22Ω	NC	23Ω	NC	1	

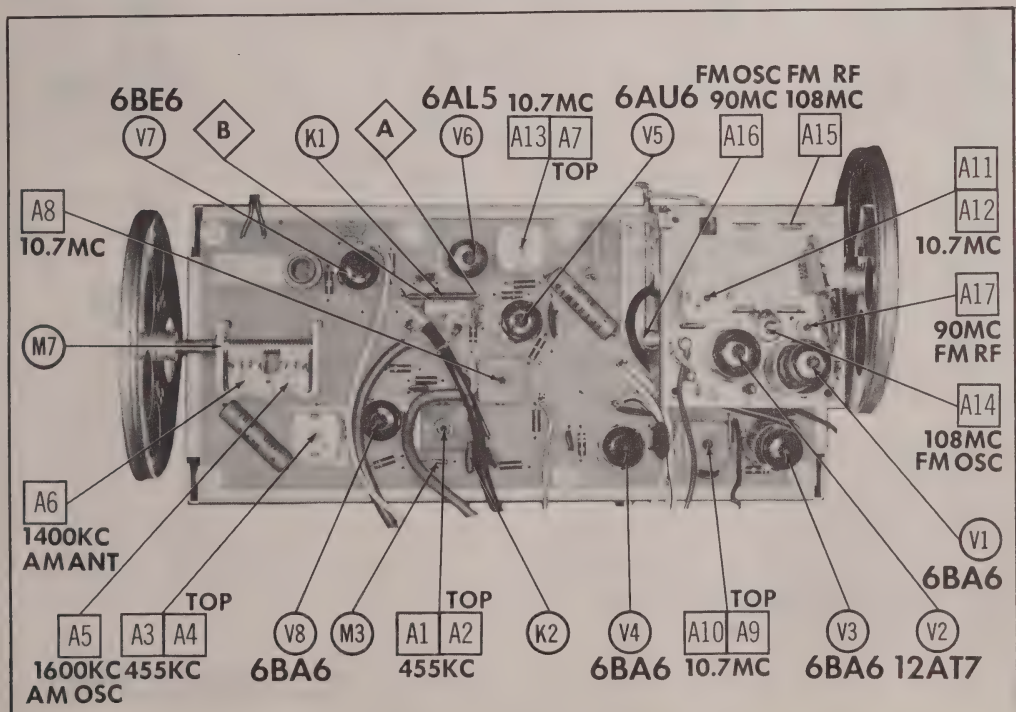
1 THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
● MEASURED IN "AM" POSITION.
† MEASURED FROM PIN 2 OF V16.

NC NO CONNECTION

WESTINGHOUSE MODELS H-M1500, H-M1501, H-M1502, H-M1503 (Ch. V-2310-3, V-2311-2)



CONTROL PANEL—REAR VIEW



TUNER CHASSIS TOP VIEW—ALIGNMENT, TUBE & MISC. IDENT.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:
A1, A2, A7 thru A13, A16, A17... GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A3, A4..... GENERAL CEMENT #5097, 8727
WALSCO #2515
A5, A6, A14, A15..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

AM ALIGNMENT—SELECTOR IN AM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to pin 7 (grid) of AM Converter. Low side to chassis.	455KC (400∿ Mod.)	(AM) Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	1400KC	Tune to 1400KC signal.	"	A6	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM—SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	High side to ungrounded tube shield floating over FM Mixer-Oscillator. Low side to chassis.	10.7MC (Unmod.)	(FM) Point of non-interference.	DC probe to point ⟨A⟩. Common to chassis.	A7, A8, A9, A10, A11, A12	Adjust for maximum deflection.
5.	"	"	"	DC probe to point ⟨B⟩. Common to chassis.	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE—SELECTOR IN FM POSITION

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	High side to ungrounded tube shield floating over FM Mixer-Osc. tube. Low side to chassis.	10.7MC (450KC Swp)	(FM) Point of non-interference.	Vert. amp. to point ⟨A⟩. Low side to chassis.	A7, A8, A9, A10, A11, A12	Disconnect stabilizing capacitor C3. Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. Reconnect C3.
5.	"	"	"	Vert. amp. to point ⟨B⟩. Low side to chassis.	A13	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT—SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	Across FM antenna terminals with 120Ω in each lead.	108MC (Unmod.)	(FM) 108MC	DC probe to point ⟨A⟩. Common to chassis.	A14, A15	Adjust for maximum deflection.
7.	"	90MC	90MC	"	A16, A17	Adjust for maximum deflection. Repeat Steps 6 and 7.

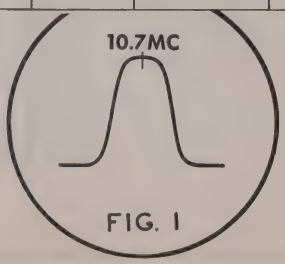


FIG. 1

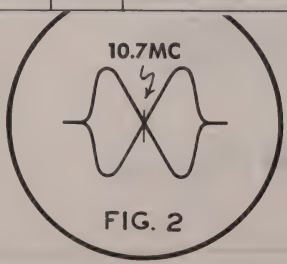
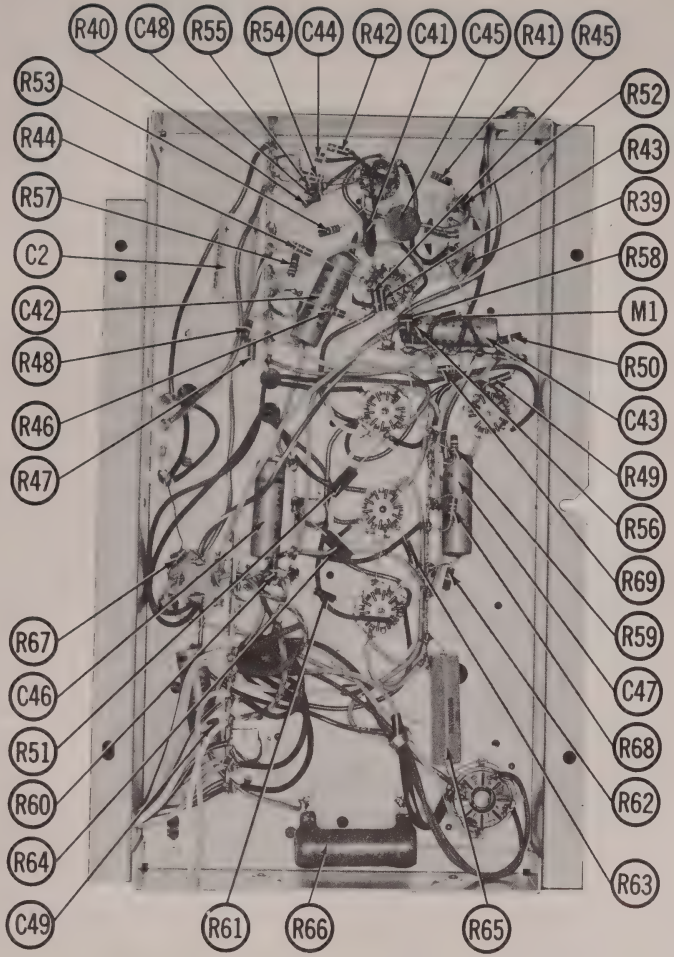
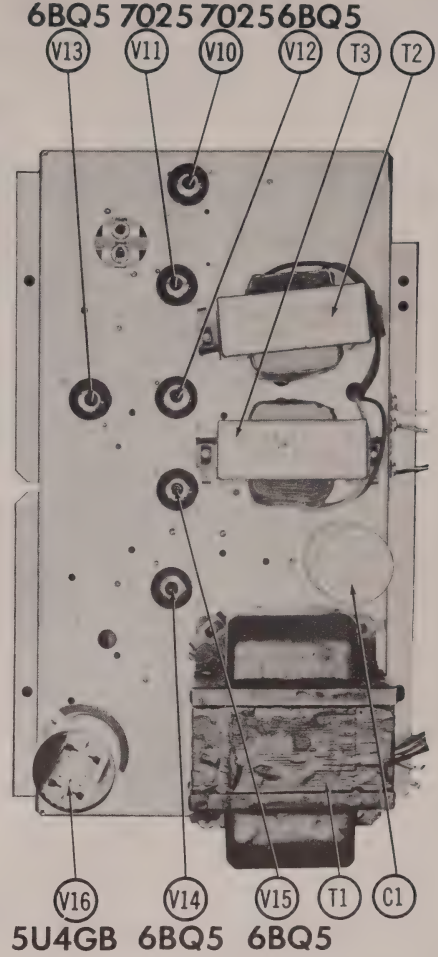


FIG. 2



AMP. CHASSIS—BOTTOM VIEW



AMP. CHASSIS—TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	FM RF Amplifier	6BA6
V2	FM Mixer-FM Osc.	12AT7
V3	1st FM IF Amplifier	6BA6
V4	2nd FM IF Amplifier	6BA6
V5	FM Limiter	6AU6
V6	Ratio Detector	6AL5
V7	AM Converter	6BE6
V8	AM IF Amplifier	6BA6
V9	Left Channel Preamp. - Right Channel Preamp.	7025
V10	Left Channel AF Amp. - Right Channel AF Amp.	7025
V11	Left Channel Phase Inv. - Right Channel Phase Inv.	7025
V12	Left Channel Output	6BQ5
V13	Left Channel Output	6BQ5
V14	Right Channel Output	6BQ5
V15	Right Channel Output	6BQ5
V16	Rectifier	5U4GB

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Westinghouse PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲80	475	218V037H09		C0373	FP385.5	TMT-38	TVL-3816	
B	■40	450			BR8045	TC77	TD-80-450	TVA-1711	
C	▲30	350							
D	10	400							
C2	100	25	218V025H14	PRS1270	BBR100-25	TC2501	TD-100-25	TVA-1207	
C3	4	50	218V012H13	PWE50005	NLW4-50	TT50X4	ML4-50	TE-1302.1	
C4	4	50NP	218V025H19	NP-PRS7405	BBR4-150	TCN504		TVANS-1302.5 *	Note 1
C5	4	50NP	218V025H19	NP-PRS7405	BBR4-150	TCN504		TVANS-1302.5 *	Note 1

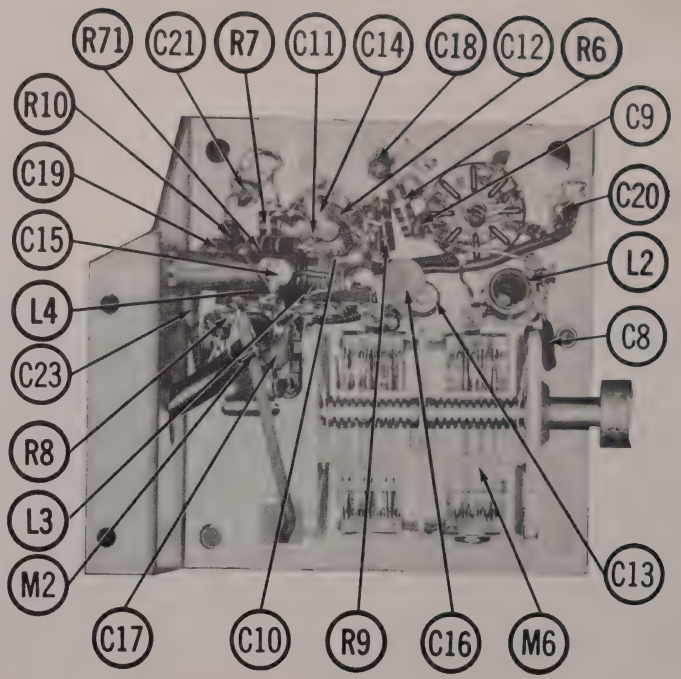
Note 1. Model H-M1502 uses 70mfd in this application (Part #218V025H41).
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	10		1468-00001	TCZ-10	5W5Q1	CM-19B-100M	MC215	1FM-410
C7	100 N1500			TCL-100		*		
C8	2200		BPD-0022	DD-222	BYA10D22	CCD-222	GP322	5HK-D22
C9	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C10	470		BPD-00047	DD-471	BYA10T47	CCD-471	GP347	10TS-T47
C11	1		NPO-SI 1.0	TCZ-1			CNO-510	10TCC-V10
C12	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C13	1.5-6	#215V307H01		829-6		CV-3	CT552	
C14	2.7 N750	#215V304H02						10TCC-V27
C15	4.7 N470	#215V304H03				*		

FM RF SUBCHASSIS



PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C16	47 N750 10%		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CN7-447	10TCC-Q47
C17	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C18	1500	#219V025H02	EF-1500			CCF-152		
C19	1500	#219V025H02	EF-1500			CCF-152		
C20	1500	#219V025H02	EF-1500			CCF-152		
C21	1500	#219V025H02	EF-1500			CCF-152		
C22	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C23	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C24	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C25	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C26	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C27	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C28	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47
C29	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C30	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C31	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-220	5HK-D22
C32	.033 600V		P688N-033	DD-303	CUB6S33	6DP-3-333	GEM-6133	6TM-S33
C33	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C34	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47
C35	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C36	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C37	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C38	.022 400V		P488N-022	DD-203	CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C39	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C40	.022 400V		P488N-022	DD-203	CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C41	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C42	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C43	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C44	22 10%		NPO-SI 22	DD-220	L10Q22	CCD-220	GP422	10TS-Q22
C45	10000		BPD-01	DD-103	BYA10S1	CCD-103	GP110	5HK-S10
C46	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C47	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C48	22 10%		NPO-SI 22	DD-220	L10Q22	CCD-220	GP422	10TS-Q22
C49	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47

Westinghouse Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	1meg		270V089H01	B-70	AD47-1meg-Z		FA16A	Loudness, Left Channel
B	1meg			SR-70	Not Req.		RU16A	Loudness, Right Channel
C	Shaft			Not Req.	FS-3		CS3500	
R2A	1meg		270V089H02	B-744			FA16A	Balance, Left Channel
B	1meg			SR-68			RU16R	Balance, Right Channel
C	Shaft			Not Req.			CS3500	

CONTROLS (cont)

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R3A	1meg		270V089H03	B-69	AD47-1meg-S		FA16L	Bass, Left Channel
B	1meg			SR-69	Not Req.		RU16L	Bass, Right Channel
C	Shaft			Not Req.	FS-3		CS3500	
R4A	1meg		270V082H02					Treble, Left Channel
B	1meg							Treble, Right Channel
C	Switch							Push-Pull, Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R5	4.7meg	
R6	680Ω	
R7	3.3meg	
R8	680Ω	
R9	10K	
R10	1meg	
R11	220K	
R12	2.2meg	
R13	470K	
R14	1000Ω	
R15	68Ω	
R16	1000Ω	
R17	68Ω	
R18	100K	
R19	22K	
R20	68Ω	
R21	10K	
R22	1meg	
R23	22K	
R24	1500Ω	
R25	1meg	
R26	3.3meg	

ITEM No.	RATING	REMARKS
R27	1000Ω	
R28	100Ω	
R29	270K	
R30	180K	
R31	10meg	
R32	270K	
R33	100K	
R34	270K	
R35	180K	
R36	10meg	
R37	270K	
R38	100K	
R39	2.2meg	
R40	330K	
R41	4700Ω	
R42	220K	
R43	1meg	
R44	68K	
R45	2200Ω	
R46	68K	
R47	1000Ω	
R48	100K	

ITEM No.	RATING	REMARKS
R49	1000Ω	
R50	100K	
R51	10Ω 1W	
R52	2.2meg	
R53	330K	
R54	4700Ω	
R55	220K	
R56	1meg	
R57	68K	
R58	2200Ω	
R59	68K	
R60	100K	
R61	1000Ω	
R62	100K	
R63	1000Ω	
R64	10Ω 1W	
R65	1500Ω 10W	#251V020H30
R66	3300Ω 15W	#251V020H27
R67	5600Ω	
R68	18K	
R69	68K	
R70	470K	
R71	680Ω	

Westinghouse Part Number.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Westinghouse PART No.	REPLACEMENT DATA	
K1	Ratio Detector Network	(3) 300mmf, 1000mmf, 68Ω, 1000Ω, 1500Ω, (2) 6800Ω, 68K	219V036H01	Aerovox	PA-694
				Centralab	PC-342
K2	AM Diode Filter	100mmf, 100mmf, 47K	219V022H03	Aerovox	PA-97
				Centralab	PC-50
				Cornell-Dubilier	111TM1
				Sprague	D-1

PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS (cont)

ITEM No.	USE	DESCRIPTION	WESTINGHOUSE PART No.	REPLACEMENT DATA
K3	Tone Comp.	100mmf, (2) 2200mmf, .022mfd, 10K, 150K	219V021H01	
K4	Tone Comp.	100mmf, (2) 2200mmf, .022mfd, 10K, 150K	219V021H01	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Westinghouse PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Ant. Coil	230V065H01						
L2	FM RF Coil	230V045H01						
L3	FM Osc. Coil	230V045H02						
L4	RF Choke	230V056H17 ①						
L5	1st FM IF Trans.	235V039H03	16-3487	16-3487	FM-254	1463		
L6	2nd FM IF Trans.	235V059H01	16-3490	16-3490		1463-PC		
L7	3rd FM IF Trans.	235V060H01						
L8	Ratio Det.	235V061H01						
L9	Loopstick	310V055H01	14-7002	14-7002	BC-418	705-A		
L10	AM Osc. Coil	230V040H04 *						
L11	1st AM IF Trans.	235V023H11	16-6780	16-6780	BC-356	13-PC1	RF-4	
L12	2nd AM IF Trans.	235V023H11	16-6780	16-6780	BC-357	13-PC2	RF-4	

① Wound on 1000Ω resistor.
* Alternate Part #296V040H04.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ∿)	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L13			2.5-2.8MH	230V089H01①						
L14			2.5-2.8MH	230V089H01①						

① Used in Model H-M1502 only.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V@ 1.3A	700VCT @ .140A Tap@ 18V @ .001A	5V@ 3A	410V019H01						
	SEC. 3	SEC. 4	SEC. 5							
	6.3 VCT @ 3.9A	6.3V@ 2.9A								

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7500Ω CT	6-8Ω	430V095H02①	24S42	A-2905	AU-609②	A-3880	24S42	S-55X②	
T3	7500Ω CT	6-8Ω	430V095H01	24S42	A-2905	AU-609②	A-3880	24S42	S-55X②	

① Alternate Part #430V095H01.
② Drill New Mounting Hole.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	12"	PM	6-8Ω	570V078H01	12A10PAZ6	* Alternate Part #570V074H02. Models H-M1500, H-M1501, H-M1502
SP2	7"	PM	6-8Ω	570V074H01 *	7A21Z68	♦ Model H-M1503
SP3	12"	PM	6-8Ω	570V078H01	12A10PAZ6	
SP4	7"	PM	6-8Ω	570V074H01 *	7A21Z68	
	7"	PM		570V074H02 ♦		

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	Westinghouse PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1		293V018H01	2E4	4A154	K200	SR200	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Westinghouse PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2		296V008H01			1N60	AFC (Pigtail)
M3	1N60	296V002H06	1N60	1N60	1N60	AM Det. (Pigtail)

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA								
	Westinghouse PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M4	671V009H01 (Includes M5)	13TBX		26DS		53	J-43, J-47X	8TA4-SD	N-8TA-SD

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS	
	Westinghouse PART No.	CLEVITE WALCO PART No.	JENSEN PART No.		
M5	690V023H05 †♦	W-103STSS † or W-103STDS †♦	S-71X † or S-71XSD †♦ or S-71XDD ♦	† Jewel	♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M6	Tuning Cap.	330V016H03	FM, 2 Gang
M7	Tuning Cap.	330V015H08	AM, 2 Gang
M8	Switch	756V050H01	Selector (Rotor Wafer Type)
M9	Switch	778V189H01	AFC (Includes Bracket Rivet Assembly)
M10	Switch		Speaker Selector (Rotary Wafer Type)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	550V135H01	Tuning
Knob	550V114H04	Loudness, Balance, Bass, Treble (Top)
Knob	559V070H01	Loudness, Treble, Bass (Bottom)
Knob	559V071H01	Balance (Bottom)
Knob	550V137H01	Selector
Dial Pointer	558V270H01	
Dial Crystal Ass'y.	559V079H01	(Part of Tuner Chassis)
Crystal	556V267H01	(Part of Cabinet)
Cabinet	516V137H01	Model H-M1500
Cabinet	516V141H01	Model H-M1501
Cabinet	516V108H01	Model H-M1502
Cabinet	516V107H01	Model H-M1503

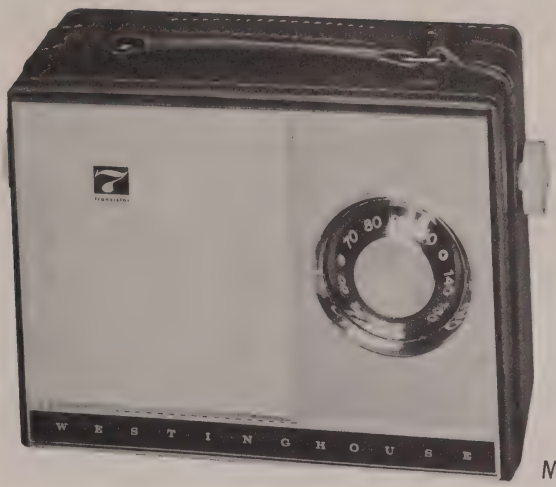
WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT® Folder with CIRCUITRACE®

WESTINGHOUSE MODELS H-729P7, H-730P7 (Ch. V-2402-1)

WESTINGHOUSE MODELS
H-729P7, H-730P7 (Ch. V-2402-1)



MODEL H-730P7

TRADE NAME	Westinghouse Models H-729P7, H-730P7 (Ch. V-2402-1)
MANUFACTURER	Westinghouse Electric Corp., Radio-Television Div., Metuchen, N. J.
TYPE SET	Battery Operated 7 Transistor Portable AM Receiver
POWER SUPPLY	6 Volts DC RATING 15 MA@6 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	530 – 1625KC 23 MA@6 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools: A1, A2, A5, A7....GENERAL CEMENT #9440
A3, A4.....GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A6, A8, A9.....GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .05mfd to Base of Converter. Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	"	530KC	Tuning gang fully closed.	"	A5	"
3.	"	1625KC	Tuning Gang Fully open.	"	A6	Adjust for maximum output. Repeat Steps 2 and 3.
4.	High side thru .05mfd to RF Amp. base. Low side to chassis.	600KC	Tune to 600KC signal.	"	A7	Adjust for maximum output.
5.	"	1400KC	1400KC	"	A8	Adjust for maximum output. Repeat Steps 4 and 5.
6.	Loop	"	"	"	A9	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

DISASSEMBLY

1. Remove knobs by pulling.
2. Open cabinet back and remove battery holder.
3. Remove 4 chassis mounting screws. (One screw grounds chassis to frame).
4. Remove chassis.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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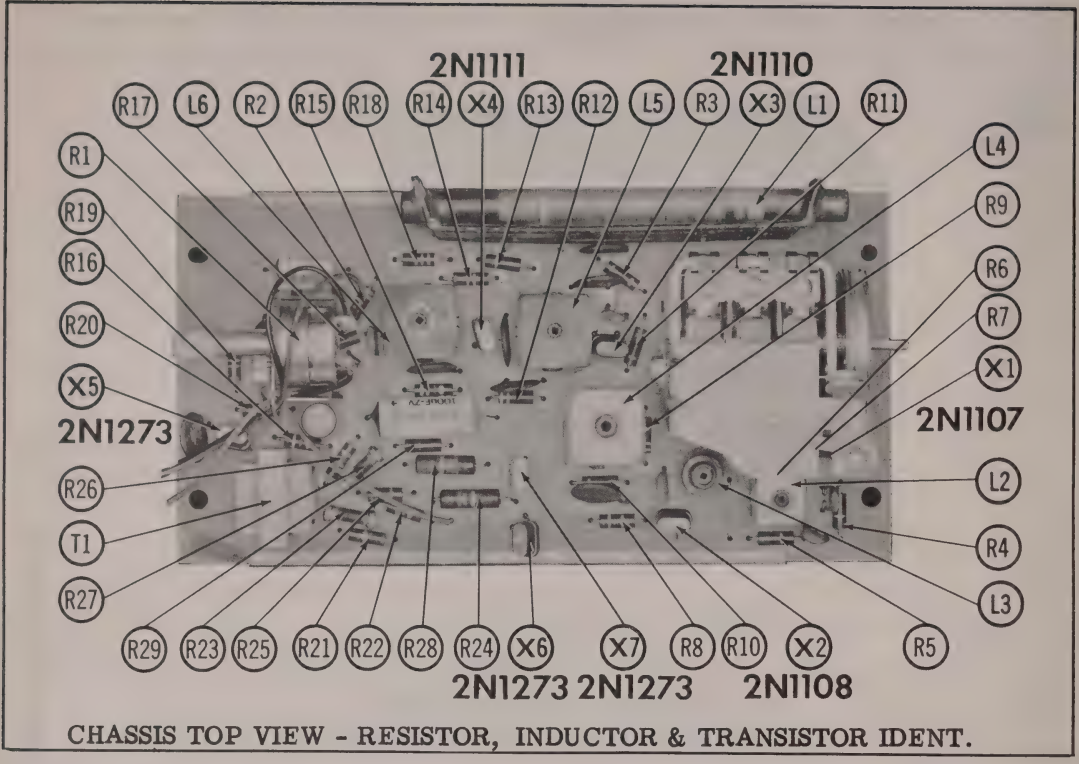
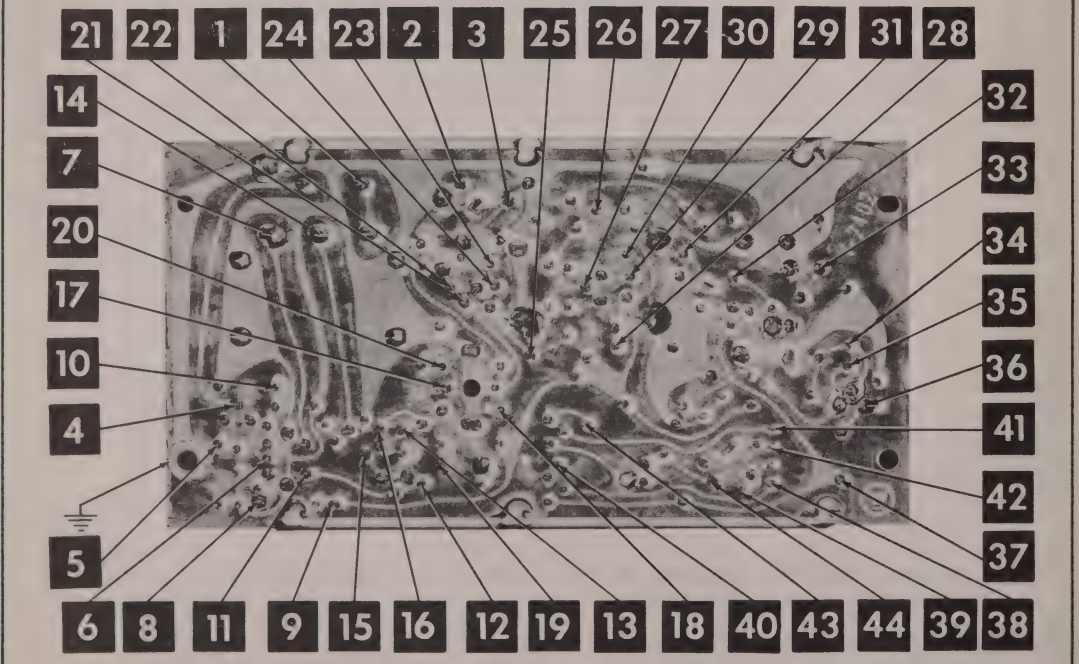
SET494 FOLDER 19

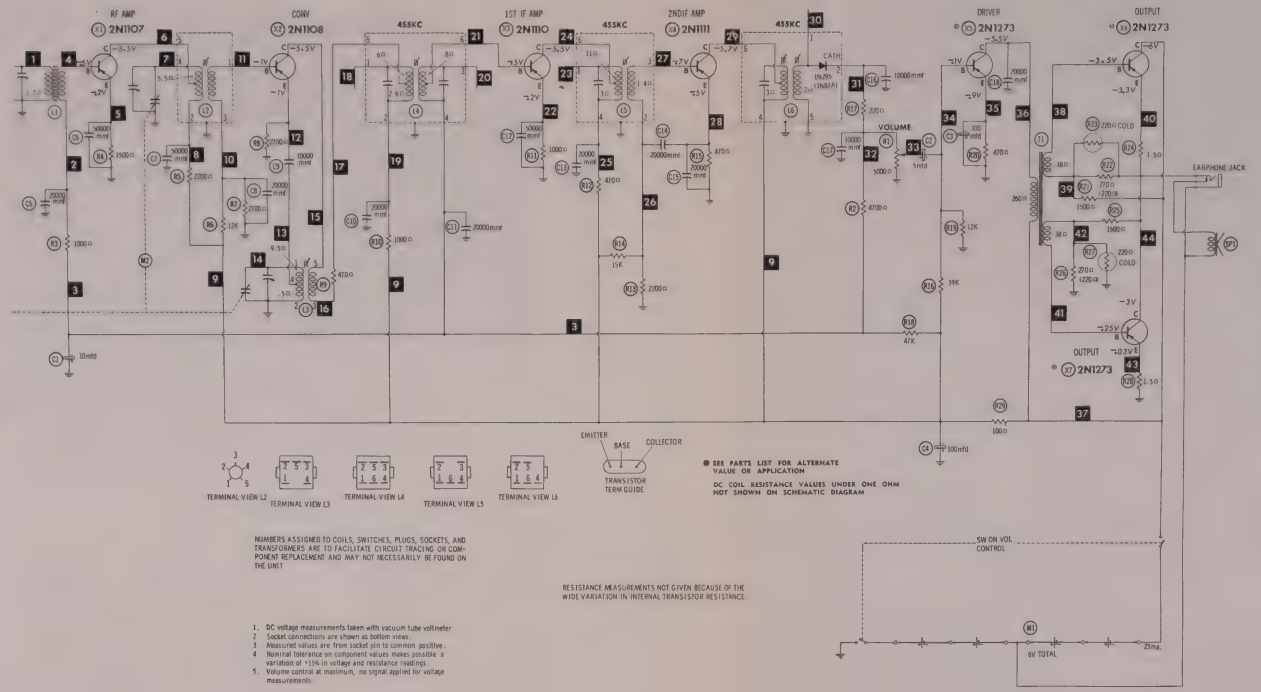


CHASSIS TOP VIEW - RESISTOR, INDUCTOR & TRANSISTOR IDENT.



A Howard W. Sams CIRCUITRACE Photo

PRINTED BOARD



● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

1. DC voltage measurements taken with vacuum tube voltmeter
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common positive.
4. Nominal tolerance on component values makes possible a variation of ±5% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CircuiTRACE

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WESTINGHOUSE MODELS
H-729P7, H-730P7 (Ch. V-2402-1)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N1107	RF Amplifier			2N487	2N409	PNP
X2	2N1108	Converter			2N486	2N412	PNP
X3	2N1110	1st IF Amplifier			2N483	2N409	PNP
X4	2N1111	2nd IF Amplifier			2N483	2N409	PNP
X5	2N1273 †	Driver		2N408		2N217	PNP
X6	2N1273 *	Output		2N408		2N217	PNP) Matched
X7	2N1273 *	Output		2N408		2N217	PNP) Pair

† (Selected) Some versions may use S120 or 2N238 in this application.
* (Selected) Some versions may use S121 or 2N185 in this application.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Westinghouse PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	10	3	218V012H16	PWE3010	NLW10-6	TT3X10	ML10-6	TE-1053	
C2	5	3	218V012H19	PWE3005	NLW5-15	TT6X5	ML5-6	TE-1052, 2	
C3	100	3	218V012H22	BCD3100	ECPBI7	TT6X100		VL-1051	
C4	100	7	218V012H15	PWE10100	NLW100-12	TT15X100	ML100-6	TE-1119, 3	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C6	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C7	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C8	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C10	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C11	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C12	50000		BPD-05	DD-503	H-05S5	1DP-2-503	GP150	5HK-S50
C13	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C14	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C15	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C16	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C17	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C18	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A B	5000Ω Switch	½	270V027H17					Volume Power Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	4700Ω	
R3	1000Ω	
R4	1500Ω	
R5	2200Ω	
R6	12K	
R7	2700Ω	
R8	2700Ω	
R9	470Ω	
R10	1000Ω	
R11	1000Ω	

ITEM No.	RATING	REMARKS
R12	470Ω	
R13	2200Ω	
R14	15K	
R15	470Ω	
R16	39K	
R17	220Ω	
R18	47K	
R19	12K	
R20	470Ω	
R21	1500Ω	

ITEM No.	RATING	REMARKS
R22	270Ω	(220Ω) *
R23	220Ω Cold	#259V010H01
R24	1.5Ω	
R25	1500Ω	
R26	270Ω	(220Ω) *
R27	220Ω Cold	#259V010H01
R28	1.5Ω	
R29	100Ω	

Westinghouse Part Number.
* Used in early production with S121 or 2N185 output transistors.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Westinghouse PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	310V057H01						
L2	RF Trans.	235V064H01						
L3	Osc. Coil	230V086H01						
L4	1st IF Trans.	235V063H01						
L5	2nd IF Trans.	235V051H01						
L6	3rd IF Trans.	235V052H01 *						

* Includes crystal detector.

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	3	1	430V076H01						
		SEC. 2							
	3	1							

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	4"	PM	24-26Ω	570V079H01	4A07Z25	

BATTERIES

ITEM No.	VOLTAGE	Westinghouse PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V *	*		230 *		A100 *		M-13R *	* 4 Required

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M2	Tuning Cap.	330V034H01	3 Gang

CABINETS & CABINET PARTS

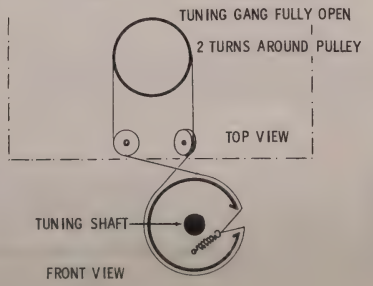
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	550V144H01	Tuning, Model H-729P7
Knob	550V144H03	Tuning, Model H-730P7
Knob	550V144H02	Volume, Model H-729P7
Knob	550V144H04	Volume, Model H-730P7
Crystal	558V266H01	
Dial	550V132H02	
Cabinet Ass'y.	513V060H01	Model H-729P7
Cabinet Ass'y.	513V060H02	Model H-730P7
Cabinet Front	513V058H01	Less Escutcheon, Crystal, Name Plate

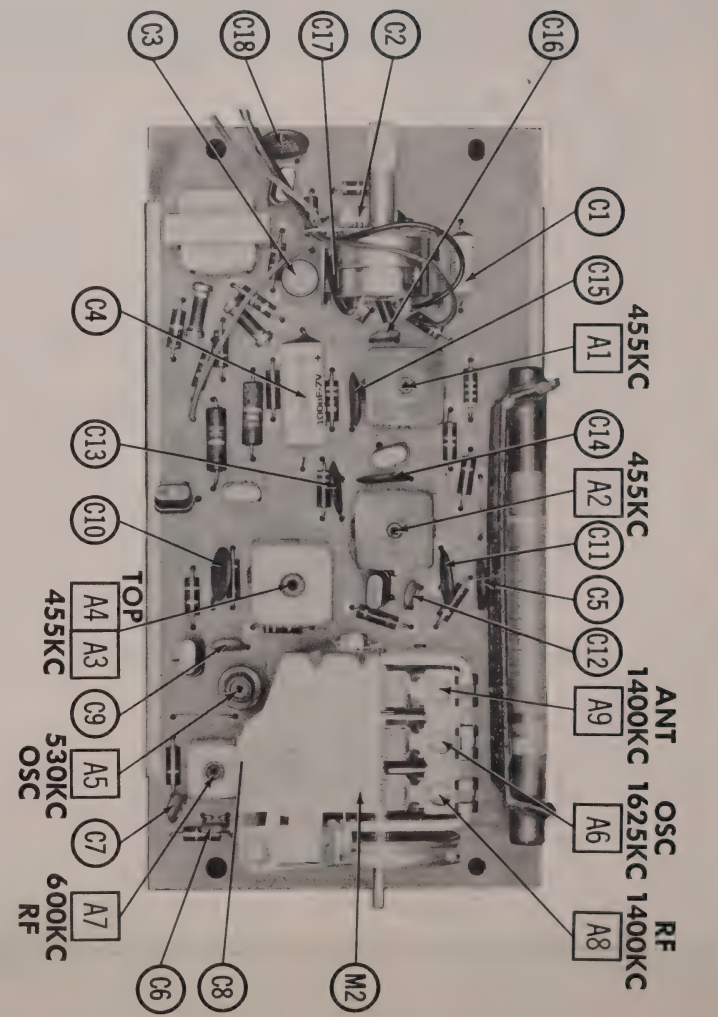
WIRING DATA

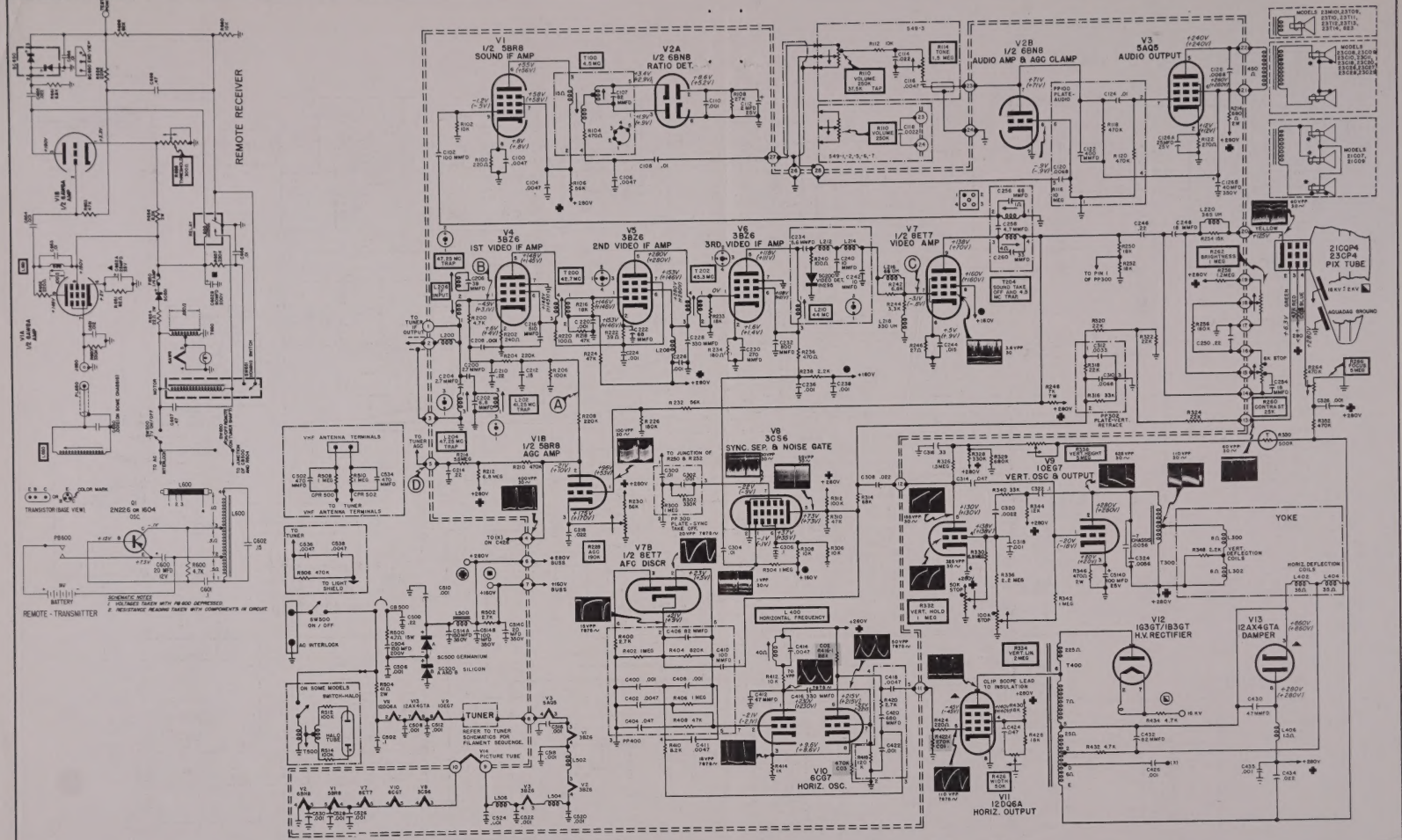
General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

DIAL CORD STRINGING



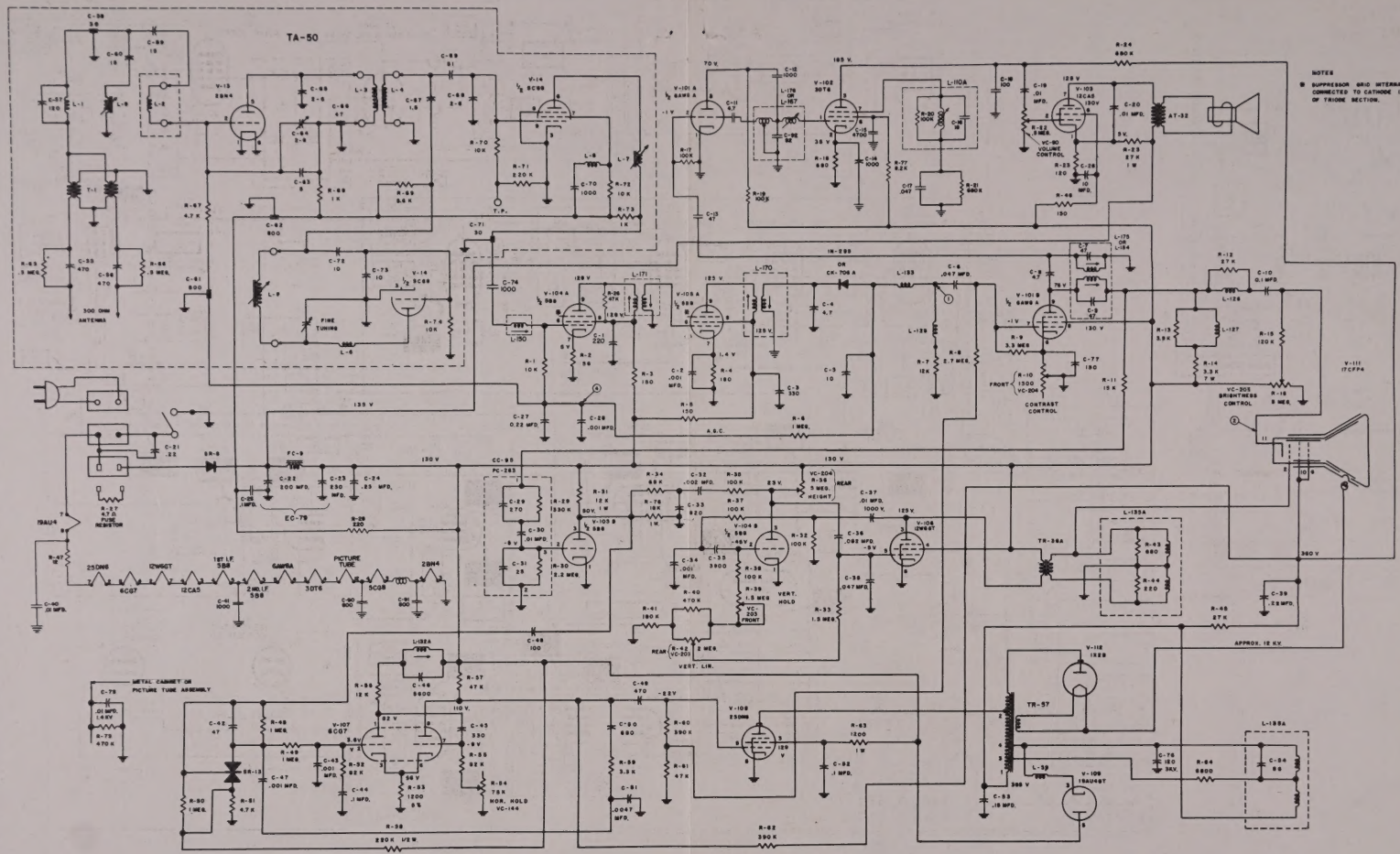
CHASSIS—TOP VIEW




REMOTE RECEIVER
REMOTE - TRANSMITTER
V1 1/2 5BR8 SOUND IF AMP
V2A 1/2 6BN8 RATIO DET.
V2B 1/2 6BN8 AUDIO AMP & AGC CLAMP
V3 5AQ5 AUDIO OUTPUT
V4 3BZ6 1ST VIDEO IF AMP
V5 3BZ6 2ND VIDEO IF AMP
V6 3BZ6 3RD VIDEO IF AMP
V7 1/2 6ET7 VIDEO AMP
V8 3CS6 SYNC. SEP. & NOISE GATE
V9 10EG7 VERT. OSC & OUTPUT
V10 6GG7 HORIZ. OSC.
V11 12DQ6A HORIZ. OUTPUT
V12 1G3GT/1B3GT H.V. RECTIFIER
V13 12AX4GTA DAMPER
V1A 1/2 5BR8 AGC AMP
V7B 1/2 6ET7 AFC DISCR
21COP4 23OP4 PIX TUBE
YOKE
TUNER
VHF ANTENNA TERMINALS
TRANSISTOR (BASE VIEW)
2N226 OR 1S04 OSC
SCHEMATIC NOTES
1. VOLTAGES TAKEN WITH PB-600 DEPRESSED.
2. RESISTANCE READING TAKEN WITH COMPONENTS IN CIRCUIT.

SYLVANIA MODELS 21C07, 21C08, 21C09, 23C10, 23C11, 23C18, 23C20, 23C26, 23C27, 23C28, 23C29, 23M101, 23T09, 23T10, 23T11, 23T12, 23T13, 23T14, 823 (CH. 549-1 thru-9)

Schematic Diagram Courtesy of Sylvania Electric Products Inc.



TRAV-LER MODEL 17P6000 (CH. 1150-59)

Schematic Diagram Courtesy of Trav-Ler Radio Corporation

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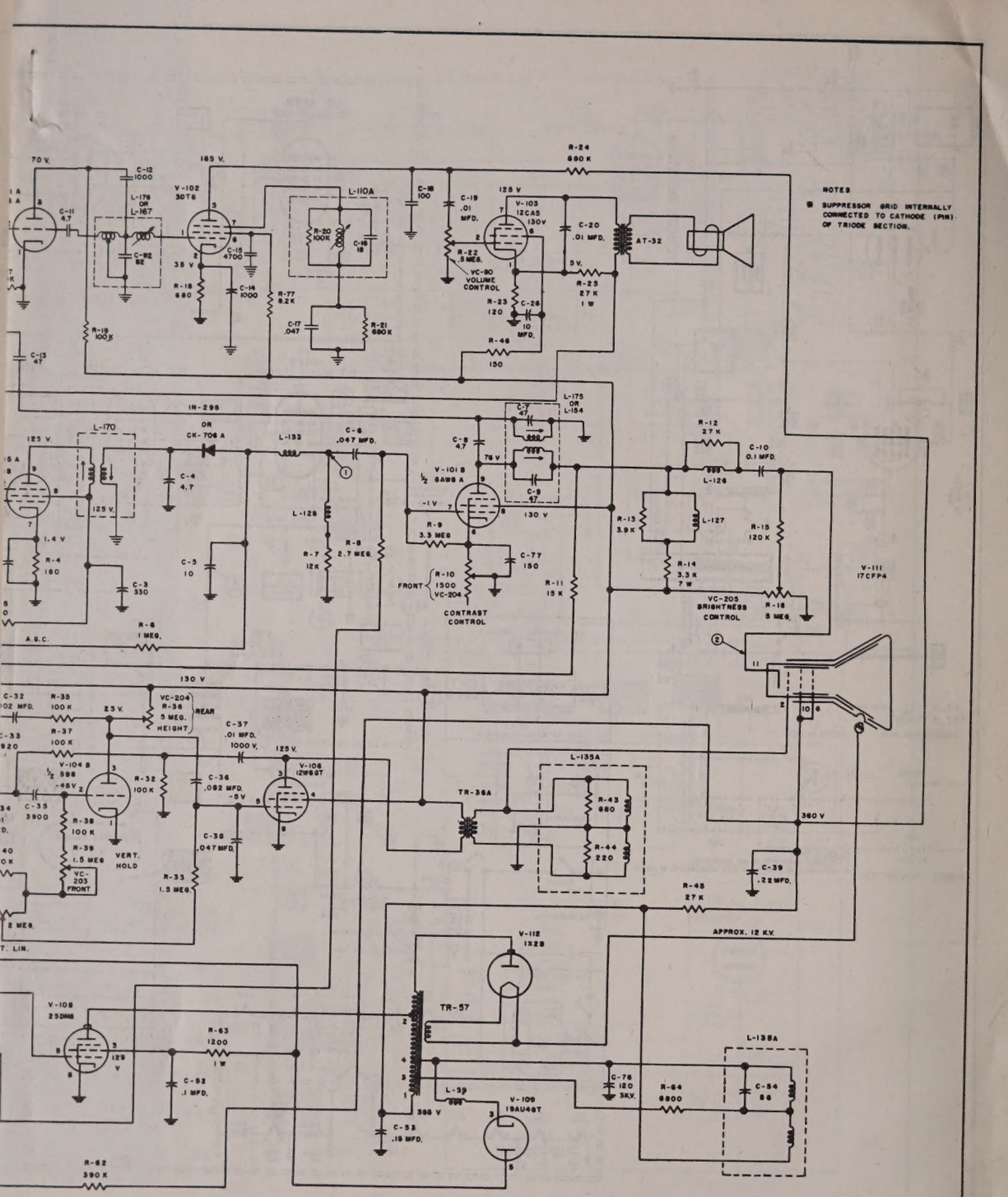

Schematic Diagram Courtesy of Trav-Ler Radio Corporation